



Test Report issued under the responsibility of UL LLC:



**TEST REPORT**  
**IEC 62031**  
**LED modules for general lighting – Safety specifications**

**Report Number..... :** 478679562-1  
**Date of issue..... :** 2015-04-03  
**Total number of pages .....** 50 pages including attachments

**Name of Testing Laboratory**  
**preparing the Report .....** UL RTP  
12 Laboratory Drive  
Research Triangle Park, NC 27709, USA

**Applicant's name .....** XICATO INC  
**Address..... :** 101 DAGGETT DR  
SAN JOSE , CA 95134-2110  
USA

**Test specification:**

**Standard .....** IEC 62031:2008 (First Edition) + A1:2012 + A2:2014  
**Test procedure .....** CB Scheme  
**Non-standard test method .....** N/A

**Test Report Form No. .... :** IEC62031C  
**Test Report Form(s) Originator .... :** Intertek Semko AB  
**Master TRF .....** 2014-11

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Test item description .....	LED Modules	
Trade Mark .....	<b>XICATO</b>	
Manufacturer .....	Same As Applicant	
Model/Type reference .....	XTMQXXVYYCCW and XCAQXXVYYCCW. See GPI for details.	
Ratings .....	50V $\leq$ max, 1500 mA max, $t_c = 90^\circ\text{C}$	
<b>Responsible Testing Laboratory (as applicable), testing procedure and testing location(s):</b>		
<input type="checkbox"/> CB Testing Laboratory:	UL RTP	
Testing location/ address .....	12 Laboratory Drive Research Triangle Park 27709 USA	
<input type="checkbox"/> Associated CB Testing Laboratory:		
Testing location/ address .....		
Tested by (name, function, signature) .....	Emmanuel Imson	
Approved by (name, function, signature)....	Teddy Sandiford	
<b>Testing procedure: TMP/CTF Stage 1:</b>		
Testing location/ address .....		
Tested by (name, function, signature) .....		
Approved by (name, function, signature)....		
<b>Testing procedure: WMT/CTF Stage 2:</b>		
Testing location/ address .....		
Tested by (name + signature) .....		
Witnessed by (name, function, signature) .:		
Approved by (name, function, signature)....		
<b>Testing procedure: SMT/CTF Stage 3 or 4:</b>		
Testing location/ address .....		
Tested by (name, function, signature) .....		
Witnessed by (name, function, signature) .:		
Approved by (name, function, signature)....		
Supervised by (name, function, signature) :		

**List of Attachments (including a total number of pages in each attachment):**

Test Results - 25 pages

Attachment 1 – Heating Data (1 page)

Attachment 2 - Photos (2 pages)

Attachment 3 - Construction Drawings (3 pages)

Attachment 4 - Photo Biological Report IEC-62778 (1 page)

Attachment 5 – Specification sheet (7 pages)

Attachment 6 – IEC 60838-2-2 DEKRA Evaluation of the Plastic Housing (11 pages)

**Summary of testing:****Tests performed (name of test and test clause):****Testing location:**

Marking	7.3	P	UL RTP 12 Laboratory Drive Research Triangle Park 27709 USA
Terminals	8 (14, 15)	N/A	
Provision for protective earthing	9 (9, IEC 61347-1)	N/A	
Protection against accidental contact with live parts	10 (10, IEC 61347-1)	N/A	
Moisture resistance and insulation	11 (11, IEC 61347-1)	P	
Electric strength	12 (12, IEC 61347-1)	P	
Fault Conditions	13 (14, IEC 61347-1)	P	
Conformity testing during manufacture	14 (Annex C)	N/A	
Construction	15	P	
Creepage distances and clearances	16 (11, IEC 60598-1)	P	
Screws current-carrying parts and connections	17 (17, IEC 61347-1)	N/A	
Resistance to heat, fire and tracking	18 (18, IEC 61347-1)	P	
Resistance to corrosion	19 (19, IEC 61347-1)	N/A	
(Normative) Tests	Annex A	P	
(Informative) Overview of systems composed of LED modules and control gear	Annex B	N/A	
(Informative) Conformity testing during manufacture	Annex C	N/A	

The results of the above tests were favourable

The measurement uncertainties stated in this Test Report have been made in accordance with our procedure for Estimating Uncertainty of Measurement, 00-LC-S0278

If requested, UL RTP will be able to estimate the uncertainty contribution for all the quantities stated in this Test Report

**Summary of compliance with National Differences:****List of countries addressed**

No National Differences, Common Differences, Group differences

☒ **The product fulfils the requirements of IEC 62031:2008 (First Edition) + A1:2012 + A2:2014.**

This test report also covers testing according to EN 62031:2008/A1:2013/A2:2015

**Copy of marking plate:**

The artwork below may be only a draft. The use of certification marks on a product must be authorized by the respective NCBs that own these marks.



<b>Test item particulars.....:</b>	
<b>Classification of installation and use.....:</b> Built- In LED Module	
<b>Supply Connection .....</b> Tails	
<b>Possible test case verdicts:</b>	
- test case does not apply to the test object.....: N/A	
- test object does meet the requirement.....: P (Pass)	
- test object does not meet the requirement.....: F (Fail)	
<b>Testing.....:</b>	
<b>Date of receipt of test item .....</b> 2015-01-28	
<b>Date (s) of performance of tests .....</b> 2015-03-02 through 2015-03-27	
<b>General remarks:</b>	
<p>"(See Enclosure #)" refers to additional information appended to the report.          "(See appended table)" refers to a table appended to the report.</p> <p>Throughout this report a <input type="checkbox"/> comma / <input checked="" type="checkbox"/> point is used as the decimal separator.</p> <p>Clause numbers between brackets refer to clauses in IEC 61347-1</p>	
<b>Manufacturer's Declaration per sub-clause 4.2.5 of IEC 60529:</b>	
The application for obtaining a CB Test Certificate includes more than one factory location and a declaration from the Manufacturer stating that the sample(s) submitted for evaluation is (are) representative of the products from each factory has been provided ..... :	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> Not applicable
<b>When differences exist; they shall be identified in the General product information section.</b>	
<b>Name and address of factory (ies).....:</b> XICATO INC 101 Daggett Dr San Jose , CA 95134-2110 USA	
<b>General product information:</b>	
The Built-In/Integral LED Module for use in luminaires shall be connected to a LED Control Gear providing maximum 50V <sub>ac</sub> . The module consists of one chip on board (COB) with two diameters of the Light Emitting Surface Area of the optic lens. The optic lens is covered with various phosphor loadings to vary the Color Temperature.	
The XTM Series is provided with the plastic housing/lampholder and is classified as Built-in and provided with pigtailed. The XCA Series is provided without the plastic housing/lampholder and is classified as Integral. The electrical ratings are shown below and are not required to be marked on the product when used without the cover and are provided in the specification sheet.	
The units may be provided with an appropriate cooling fan to operate at the specified Tc temperature rating when installed in the end product Luminaire. Note the unit was evaluated with the units mounted on a ribbed heatsink measuring 11 cm diameter, 8 cm high	

The DEKRA Informative report No. 2171353.50 provides for the evaluation of plastic housing/lampholder per IEC 60838-2-2 with a rating of 50Vrms or 70Vdc (See Attachment 6).

The LED Module has also been evaluated to check the photobiological effects in accordance with the standard IEC/EN 62778 and the results are located in the photobiological test report conducted by UL-RTP (Report Reference No. 4786795628 with the following Lamp Classification group: LOW RISK GROUP 1

The units have been additionally evaluated based on an insulation working voltage of 43.8Vrms/61.9Vdc to accessible parts. The product shall be insulated from the end-product enclosure for higher working voltages.

MODEL NOMENCLATURE:

XTMQQXXVYYCCW and XCAQQXXVYYCCW

Where:

QQ - Can be 09 or 19 for identifying LES (light Emitting surface) area in mm

XX - Can be 80, V8, 90, 95, or V9, for Color Rendering Index

VV - Can be 27, 30, 35, or 40 for the Color Temperature in K


YY - Can be 07, 13, 20, 30, 40, or 50 for the Flux Output in lm

CC - Can be CC for External Driver type

W - Any alpha-numeric code for Revision history

Model Series XTMQQXXVYYCCW is the Built-In version employing the plastic housing.

Model XCAQQXXVYYCCW is the Integral Classification without the plastic housing employed.

IEC 62031			
Clause	Requirement + Test	Result - Remark	Verdict
<b>4</b>	<b>GENERAL REQUIREMENTS</b>		-
4.4	Integral modules tested assembled in the luminaire	Evaluated as Built-in (for XTM Series) with optional cover/lampholder (for XCA Series)	N/A
4.5	Independent modules complies with requirements in IEC 60598-1		N/A
<b>5</b>	<b>GENERAL TEST REQUIREMENTS</b>		-
5.5	SELV-operated LED modules comply with Annex I of IEC 61347-2-13	(see Annex 1)	N/A
	General conditions for tests in Annex A	(see Annex A)	P
<b>6</b>	<b>CLASSIFICATION</b>		-
	Built-in module .....	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	—
	Independent module.....	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	—
	Integral module .....	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	—
	For Integral module; Note to 1.2.1 in IEC 60598-1 applies.	Noted	—
<b>7</b>	<b>MARKING</b>		-
<b>7.1</b>	<b>Mandatory markings for built-in or independent modules</b>		-
	a) mark of origin	<b>XICATO</b>	P
	b) model number, type reference	See GPI	P
	c1) constant voltage module; rated supply voltage and supply frequency		N/A.
	c2) constant current module; rated supply current and supply frequency	See GPI	P
	d) nominal power		N/A
	e) indication of connections, wiring diagram	Polarity + and – stamped on the plastic LED Holder.	P
	f) value of $t_c$ and place on the module	$t_c = 90^\circ\text{C}$ and is stamped on the plastic LED Holder.	P
	g) $E_{thr}$ if required	Low Risk Group 1	N/A
	h) symbol for built-in modules	 on the product or Packaging	P
	i) heat transfer temperature $t_d$		N/A

IEC 62031			
Clause	Requirement + Test	Result - Remark	Verdict
	j) power for heat-conduction $P_d$		N/A
	k) working voltage for insulation	The product has been investigated for a working voltage of 43.8Vrms/61.9V <sub>---</sub> to accessible parts.	P
<b>7.2</b>	<b>Location of marking</b>		-
	-marking of a), b), c) and f)	Shall be on the Module	P
	-marking of d), e), g), h), i) and j)		P
	-marking of k)		P
	-integral modules a) to g) in literature	See Attachment 4.	P
<b>7.3</b>	<b>Durable and legibility of marking</b>		-
	- marking of a), b), c) and f) legible after test with water		P
	- marking of d) to j) inspection of compliance		P
<b>8</b>	<b>TERMINALS</b>		-
	Screw terminals according section 14 of IEC 60598-1:		-
	Separately approved; component list	(see Annex 2)	N/A
	Part of the luminaire	(see Annex 3)	N/A
	Screwless terminals according section 15 of IEC 60598-1:		-
	Separately approved; component list	(see Annex 2)	N/A
	Part of the luminaire	(see Annex 4)	N/A
	Connectors according IEC 60838-2-2:		
	Separately approved; component list	LED Holder previously evaluated to IEC 60838-2-2 as an integral part of the module evaluation. See GPI for the referenced CB report	P
<b>9 (9)</b>	<b>PROVISION FOR PROTECTIVE EARTHING</b>		-
<b>- (9.1)</b>	<b>Provisions for protective earthing</b>		-
	Terminal complying with clause 8		N/A
	Locked against loosening and not possible to loosen by hand		N/A
	Not possible to loosen clamping means unintentionally on screwless terminals		N/A
	Earthing via means of fixing		N/A



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Clause	Requirement + Test	Result - Remark	Verdict
	Earthing terminal only used for the earthing of the control gear		N/A
	All parts of material minimizing the danger of electrolytic corrosion		N/A
	Made of brass or equivalent material		N/A
	Contact surface bare metal		N/A
<b>- (9.2)</b>	<b>Provision for functional earthing</b>		-
	Comply with clause 8 and 9.1		N/A
<b>- (9.3)</b>	<b>Earth contact via the track on the printed board</b>		-
	Test with a current of 25 A between earthing terminal and each of the accessible metal parts; measured resistance ( $\Omega$ ) at $\geq 10$ A according 7.2.3 of IEC 60598-1: $< 0,5 \Omega$ .....		N/A
<b>- (9.4)</b>	<b>Earthing of built-in lamp controlgear</b>		-
	Earth by means of fixing to earthed metal of luminaire in compliance of 7.2 of IEC 60598-1		N/A
	Earthing terminal only for earthing the built-in controlgear		N/A
<b>- (9.5)</b>	<b>Earthing via independent controlgear</b>		-
<b>- (9.5.1)</b>	<b>Earth connection to other equipment</b>		-
	Looping or through connection, conductor min. 1,5 mm <sup>2</sup> and of copper or equivalent		N/A
	Protective earthing wires in line with 5.3.1.1 and clause 7		N/A
<b>- (9.5.2)</b>	<b>Earthing of the lamp compartments powered via the independent lamp controlgear</b>		-
	Test with a current of 25 A between input and output earth terminals; measured resistance ( $\Omega$ ) between earthing terminal and each of the accessible metal parts at $\geq 10$ A according 7.2.3 of IEC 60598-1: $< 0,5 \Omega$ .....		N/A
	Output earthing terminal marked as in 7.1 t) of IEC 61347-1		N/A
<b>10 (10)</b>	<b>PROTECTION AGAINST ACCIDENTAL CONTACT WITH LIVE PARTS</b>		-
<b>- (10.1)</b>	<b>Controlgear protected against accidental contact with live parts</b>		N/A
<b>- (A2)</b>	<b>The current flowing between the part concerned and earth is measured and does not exceed 0,7 mA (peak) or 2 mA d.c. ....</b>		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
- (A2)	For frequencies above 1 kHz, the current does not exceed 0,7 mA (peak) multiplied by the value of the frequency in kilohertz or 70 mA (peak) .....		N/A
- (A3)	The voltage between the part concerned and any accessible part is measured and does not exceed 34 V (peak).....		N/A
- (10.1)	Lacquer or enamel not used for protection or insulation		N/A
	Adequate mechanical strength on parts providing protection		N/A
- (10.2)	Capacitors > 0,5 $\mu$ F: voltage after 1 min (V): < 50 V .....		N/A
- (10.3)	Controlgear providing SELV		-
	Accessible conductive parts are insulated from live parts by double or reinforced insulation in SELV controlgear		N/A
	No connection between output circuit and the body or protective earthing circuit		N/A
	No possibility of connection between output circuit and the body or protective earthing circuit through other conductive parts		N/A
	SELV outputs separated by at least basic insulation		N/A
	ELV conductive parts insulated as live parts		N/A
	Tests according Annex L of IEC 61347-1		N/A
- (10.4)	Accessible conductive parts in SELV circuits		-
	Output voltage under load $\leq 25$ V r.m.s. or $\leq 60$ V d.c.		N/A
	If output voltage > 25 V r.m.s. or > 60 V d.c.; No load output $\leq 35$ V peak or $\leq 60$ V d.c and touch current does not exceed 0,7 mA (peak) or 2 mA d.c. .... :		N/A
	One conductive part is insulated if output voltage or current exceeding the values above and withstand test voltage 500 V		N/A
	Double or reinforced insulation bridged by appropriate and at least two resistors or two Y2 capacitors or one Y1 capacitor		N/A
	Y1 or Y2 capacitors comply with IEC 60384-14		N/A
	Resistors comply with test (a) in 14.1 of IEC 60065		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
<b>11 (11)</b>	<b>MOISTURE RESISTANCE AND INSULATION</b>		-
	After storage 48 h at 91-95% relative humidity and 20-30 °C measuring of insulation resistance with d.c. 500 V (MΩ):		P
	For basic insulation $\geq 2 \text{ M}\Omega$ .....	>10 MΩ measured between live parts and foiled cover	P
	For double or reinforced insulation $\geq 4 \text{ M}\Omega$ .....		N/A
	Between primary and secondary circuits in controlgear providing SELV, values in Annex L in IEC 61347-1		N/A
<b>12 (12)</b>	<b>ELECTRIC STRENGTH</b>		-
	Immediately after clause 11 electric strength test for 1 min	500 Vac	P
	Basic insulation for SELV, test voltage 500 V		N/A
	Working voltage $\leq 50 \text{ V}$ , test voltage 500 V	Working voltage 50 Vrms or 70 V= Between live parts of opposite polarity on PCB.	P
	Working voltage $> 50 \text{ V} \leq 1000 \text{ V}$ , test voltage (V):		-
	Basic insulation, $2U + 1000 \text{ V}$		N/A
	Supplementary insulation, $2U + 1000 \text{ V}$		N/A
	Double or reinforced insulation, $4U + 2000 \text{ V}$		N/A
	No flashover or breakdown		P
	Solid or thin sheet insulation for double or reinforced insulation fulfil the requirements in Annex N in IEC 61347-1		N/A
<b>13 (14)</b>	<b>FAULT CONDITIONS</b>		-
- (14)	When operated under fault conditions the controlgear:		-
	- does not emit flames or molten material		P
	- does not produce flammable gases		P
	- protection against accidental contact not impaired		P
	Thermally protected controlgear does not exceed the marked temperature value		N/A
	Fault conditions: capacitors, resistors or inductors without proof of compliance with relevant specifications have been short-circuited or disconnected	(see appended table)	N/A

IEC 62031			
Clause	Requirement + Test	Result - Remark	Verdict
- (14.1)	Short-circuit of creepage distances and clearances if less than specified in clause 16 in Part 1 (except between live parts and accessible metal parts)	(see appended table)	N/A
	Creepage distances on printed boards less than specified in clause 16 in Part 1 provided with coating according to IEC 60664-3		N/A
- (14.2)	Short-circuit or interruption of semiconductor devices	(see appended table)	P
- (14.3)	Short-circuit across insulation consisting of lacquer, enamel or textile	(see appended table)	N/A
- (14.4)	Short-circuit across electrolytic capacitors	(see appended table)	N/A
- (14.5)	After the tests has been carried out on three samples:		-
	The insulation resistance $\geq 1 \text{ M}\Omega$ .....		N/A
	No flammable gases		N/A
	No accessible parts have become live		N/A
	During the tests, a five-layer tissue paper, where the test specimen is wrapped, does not ignite		N/A
- (14.6)	Relevant fault condition tests with high-power supply		N/A
<b>13.2</b>	<b>Overpower condition</b>		-
	Module withstands overpower condition >15 min.		P
	Module with automatic protective device or power limiter, test performed 15 min. at limit.		N/A
	No fire, smoke or flammable gas is produced		P
	Molten material does not ignite tissue paper, spread below the module		P
<b>15</b>	<b>CONSTRUCTION</b>		-
	Wood, cotton, silk, paper and similar fibrous material not used as insulation		P
<b>16 (16)</b>	<b>CREEPAGE DISTANCES AND CLEARANCES</b>		-
- (16)	Creepage and distances and clearances in compliance with IEC 61347-1	2.5 mm between opposite polarity (+ and – copper pads)	P
	Insulating lining of metallic enclosures		N/A
	Basic insulation on printed boards tested according to clause 14		N/A
	Distances subjected to both sinusoidal voltage as non-sinusoidal pulses not less than value in Table 16		N/A
	Creepage distances not less than minimum clearance		P

IEC 62031			
Clause	Requirement + Test	Result - Remark	Verdict
16 (-)	Conductive accessible parts in compliance with applicable parts of IEC 60598-1	<p>See Table 3.</p> <p>For XTM19, XTM09, working voltage of 43.8Vrms, Limit 0.85 mm creepage and 0.2 for Clearance.</p> <p>Measured from foil pad to metal base: Cr &amp; CL: 0.9 mm (XTM09) and 1.0 mm (XTM19) )</p> <p>Measured from the cover contacts to the top of the external surface cover</p> <p>Cr &amp; CL: &gt;2.0 mm (XTM09 and XTM19)</p>	P

<b>17 (17)</b>	<b>SCREWS, CURRENT-CARRYING PARTS AND CONNECTIONS</b>		-
	Cl. 17 refer to Cl. 17 of IEC 61347-1 which refer to Cl. 4.11 and 4.12 of IEC 60598-1 (clause numbers between parentheses refer to IEC 60598-1)		—
<b>(4.11)</b>	<b>Electrical connections</b>		-
(4.11.1)	Contact pressure		N/A
(4.11.2)	Screws:		-
	- self-tapping screws		N/A
	- thread-cutting screws		N/A
(4.11.3)	Screw locking:		-
	- spring washer		N/A
	- rivets		N/A
(4.11.4)	Material of current-carrying parts		N/A
(4.11.5)	No contact to wood or mounting surface		N/A
(4.11.6)	Electro-mechanical contact systems		N/A
<b>(4.12)</b>	<b>Mechanical connections and glands</b>		-
(4.12.1)	Screws not made of soft metal		N/A
	Screws of insulating material		N/A
	Torque test: torque (Nm); part.....:		N/A
	Torque test: torque (Nm); part.....:		N/A
	Torque test: torque (Nm); part.....:		N/A
(4.12.2)	Screws with diameter < 3 mm screwed into metal		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
(4.12.4)	Locked connections:		-
	- fixed arms; torque (Nm) .....		N/A
	- lampholder; torque (Nm) .....		N/A
	- push-button switches; torque 0,8 Nm .....		N/A
(4.12.5)	Screwed glands; force (Nm).....		N/A
<b>18 (18)</b>	<b>RESISTANCE TO HEAT, FIRE AND TRACKING</b>		-
- (18.1)	Ball-pressure test .....	See Test Table 18 (18.1) Plastic Housing - 125°C Ring	P
- (18.3)	Glow-wire test (650°C) .....	See Test Table 18 (18.3) Plastic Housing and LED Lens	P
- (18.4)	Needle-flame test (10 s) .....	See Test Table 18 (18.4) Plastic Housing and LED Lens	P
- (18.5)	Proof tracking test .....	See Test Table 18 (18.5) Plastic Housing and Metal clad with dielectric layer conducted at 175V	P
<b>19 (19)</b>	<b>RESISTANCE TO CORROSION</b>		-
	- test according 4.18.1 of IEC 60598-1		N/A
	- adequate varnish on the outer surface		N/A
<b>20</b>	<b>INFORMATION FOR LUMINAIRE DESIGN</b>		-
	Information in Annex D (informative)		—
<b>21</b>	<b>HEAT MANAGEMENT</b>		-
<b>21.1</b>	<b>General</b>		-
	Exchangeability is safeguarded by cap or base		N/A
<b>21.2</b>	<b>Heat-conducting foil and paste</b>		-
	Heat-conducting foil delivered with the module if necessary		N/A
<b>22</b>	<b>PHOTOBIOLOGICAL SAFETY</b>		-
<b>22.1</b>	<b>UV radiation</b>		-
	Luminous radiation not exceed 2mW/klm		N/A
<b>22.2</b>	<b>Blue light hazard</b>		-
	Assessed according to IEC TR 62778	Risk Group 1 See Attachment 3	P

IEC 62031			
Clause	Requirement + Test	Result - Remark	Verdict
<b>22.3</b>	<b>Infrared radiation</b>		-
	Requirements for infrared radiation when required		N/A
<b>A</b>	<b>ANNEX A - TESTS</b>		-
	All tests performed in accordance with the advice given in Annex H of IEC 61347-1, if applicable		P
<b>13 (14)</b>	<b>TABLE: tests of fault conditions</b>		
<b>Part</b>	<b>Simulated fault</b>		<b>Hazard</b>
	OVER POWER CONDITIONS @ 112 W (150% of power) – UNIT operated continuously with no visual damage.		No

IEC 62031			
Clause	Requirement + Test	Result - Remark	Verdict

<b>16 (16)</b>	<b>TABLES: Creepage distances and clearances per IEC60598-1</b>						P
<b>Table 3</b>	<b>Minimum distances (mm) for a.c. (50/60 Hz) sinusoidal voltages</b>						
RMS working voltage (V) not exceeding		50	150	250	500	750	1000
<b>Creepage distances</b>							
Required basic insulation, PTI $\geq$ 600		0,6	0,8	1,5	3	4	5,5
Measured		N/A					
Required basic insulation, PTI < 600		1,2	1,6	2,5	5	8	10
Measured		See Clause 16					
Required supplementary insulation PTI $\geq$ 600		-	0,8	1,5	3	4	5,5
Measured		N/A					
Required supplementary insulation PTI < 600		-	1,6	2,5	5	8	10
Measured		N/A					
Required reinforced insulation		-	3,2	5	6	8	11
Measured		N/A					
<b>Clearances</b>							
Required basic insulation		0,2	0,8	1,5	3	4	5,5
Measured		See Clause 16					
Required supplementary insulation		-	0,8	1,5	3	4	5,5
Measured		N/A					
Required reinforced insulation		-	1,6	3	6	8	11
Measured							
<b>Table 4</b>	<b>Minimum distances (mm) for non-sinusoidal pulse voltages</b>						



IEC 62031							
Clause	Requirement + Test			Result - Remark			Verdict
Rated pulse voltage (peak kV)	2,0	2,5	3,0	4,0	5,0	6,0	8,0
Required clearances	1,0	1,5	2	3	4	5,5	8
Measured	N/A						
Rated pulse voltage (peak kV)	10	12	15	20	25	30	40
Required clearances	11	14	18	25	33	40	60
Measured	N/A						
Rated pulse voltage (peak kV)	50	60	80	100	-	-	-
Required clearances	75	90	130	170	-	-	-
Measured	N/A						

IEC 62031			
Clause	Requirement + Test	Result - Remark	Verdict

18 (18.1)	TABLE: Ball Pressure Test of Thermoplastics			P
Allowed impression diameter (mm) ..... :		2.0 mm		—
Object/ Part No./ Material	Manufacturer/ trademark	Test temperature (°C)	Impression diameter (mm)	
Plastic Housing	See Annex 2	125	0.8	
Supplementary information:				

<b>18 (18.3)</b>	<b>TABLE: Glow-wire test</b>				<b>P</b>
<b>Glow wire temperature .....</b>		<b>650°C</b>			<b>—</b>
Object/ Part No./ Material	Manufacturer/ trademark	Duration of application of test flame (ta); (s)	Ignition of specified layer Yes/No	Duration of burning (tb) (s)	Verdict
Lens of LED Package Core	See Annex 2	30	NO	N/A	P
Plastic Housing	See Annex 2	30	NO	N/A	P
Any flame or glowing of the sample extinguished within 30 s of withdrawing the glow-wire, and any burning or molten drop did not ignite the underlying parts (Yes/No)..... :					NO
Supplementary information:					

<b>18 (18.4)</b>	<b>TABLE: Needle-flame test</b>				<b>P</b>
Object/ Part No./ Material	Manufacturer/ trademark	Duration of application of test flame (ta); (s)	Ignition of specified layer Yes/No	Duration of burning (tb) (s)	Verdict
Lens of LED Package Core	See Annex 2	10	NO	N/A	P
Plastic Housing	See Annex 2	10	NO	N/A	P
Supplementary information:					

IEC 62031			
Clause	Requirement + Test	Result - Remark	Verdict

18 (18.5)	TABLE: Proof tracking test				P
Test voltage PTI ..... :			175 V		—
Object/ Part No./ Material	Manufacturer/ trademark	Withstand 50 drops without failure on three places or on three specimens			Verdict
Metal Clad Board with Dielectric Layer	See Annex 2	YES	YES	YES	P
Plastic Housing	See Annex 2	YES	YES	YES	P
Supplementary information:					

<b>ANNEX 1</b>	<b>SELV-operated LED modules</b>			-
	Cl. 5.5 refer to ANNEX I of IEC 61347-2-13 which refer to ANNEX L of IEC 61347-1 (clause numbers between parentheses refer to ANNEX L of IEC 61347-1)			—
<b>(L.3)</b>	<b>Classification</b>			<b>N/A</b>
	Class I	Yes <input type="checkbox"/>	No <input type="checkbox"/>	—
	Class II	Yes <input type="checkbox"/>	No <input type="checkbox"/>	—
	Class III	Yes <input type="checkbox"/>	No <input type="checkbox"/>	—
	non-inherently short circuit proof controlgear	Yes <input type="checkbox"/>	No <input type="checkbox"/>	—
	inherently short circuit proof controlgear	Yes <input type="checkbox"/>	No <input type="checkbox"/>	—
	fail safe controlgear	Yes <input type="checkbox"/>	No <input type="checkbox"/>	—
	non-short-circuit proof controlgear	Yes <input type="checkbox"/>	No <input type="checkbox"/>	—
<b>(L.4)</b>	<b>Marking</b>			-
	Adequate symbols are used			N/A
<b>(L.5)</b>	<b>Protection against electric shock</b>			-
	Comply with 9.2 of IEC 61558-1			N/A
<b>(L.6)</b>	<b>Heating</b>			-
	No excessive temperatures in normal use			N/A
	Value if capacitor tc marked .....			—
	Winding insulation classified as Class .....			—
	Comply with tests of clause 14 of IEC 61558-1 with adjustments			N/A
<b>(L.7)</b>	<b>Short-circuit and overload protection</b>			-
	Comply with tests of clause 15 of IEC 61558-1 with adjustments			N/A
<b>(L.8)</b>	<b>Insulation resistance and electric strength</b>			-
<b>(L.8.1)</b>	Conditioned 48 h between 91 % and 95 %			N/A

IEC 62031			
Clause	Requirement + Test	Result - Remark	Verdict
(L.8.2)	Insulation resistance		-
	Between input- and output circuits not less than 5 MΩ .....		N/A
	Between metal parts of class II convertors which are separated from live parts by basic insulation only and the body not less than 5 MΩ .....		N/A
	Between metal foil in contact with the inner and outer surfaces of enclosures of insulating material not less than 2 MΩ .....		
(L.8.3)	Electric strength		-
	1) Between live parts of input circuits and live parts of output circuits .....		N/A
	2) Over basic or supplementary insulation between:		-
	a) live parts having different polarity .....		N/A
	b) live parts and body if intended to be connected to protective earth .....		N/A
	c) accessible metal parts and a metal rod of the same diameter as the flexible cable or cord .....		N/A
	d) live parts and an intermediate metal part .....		N/A
	e) intermediate metal parts and the body .....		N/A
	f) each input circuit and all other input circuits .....		N/A
	3) Over reinforced insulation between the body and live parts .....		N/A
(L.9)	Construction		-
(L.9.1)	Transformer comply with 19.12 of IEC 61558-1 and 19 of IEC 61558-2-6		N/A
	HF transformer comply with 19 of IEC 61558-2-16		N/A
(L.10)	Components		-
	Protective devices comply with 20.6 – 20.11 of IEC 61558-1		N/A
(L.11)	Creepage distances and clearances		-
	1. Insulation between input and output circuits, basic insulation:		-
	a) measured values $\geq$ specified values (mm) .....		N/A
	b) measured values $\geq$ specified values (mm) .....		N/A
	c) measured values $\geq$ specified values (mm) .....		N/A
	2. Insulation between input and output circuits, double or reinforced insulation:		-
	a) measured values $\geq$ specified values (mm) .....		N/A
	b) measured values $\geq$ specified values (mm) .....		N/A

IEC 62031			
Clause	Requirement + Test	Result - Remark	Verdict
	c) measured values $\geq$ specified values (mm) .....		N/A
	3. Insulation between adjacent <u>output</u> circuits		-
	- measured values $\geq$ specified values (mm) .....		N/A
	4. Insulation between terminals for external connection:		-
	- measured values $\geq$ specified values (mm) .....		N/A
	5. Basic or supplementary insulation:		-
	a) measured values $\geq$ specified values (mm) .....		N/A
	b) measured values $\geq$ specified values (mm) .....		N/A
	c) measured values $\geq$ specified values (mm) .....		N/A
	d) measured values $\geq$ specified values (mm) .....		N/A
	e) measured values $\geq$ specified values (mm) .....		N/A
	6. Reinforced insulation or insulation:		-
	Between body and output circuit: measured values $\geq$ specified values (mm) .....		N/A
	Between body and output circuit if provision against transient voltages: measured values $\geq$ specified values (mm) .....		N/A
	7. Distance through insulation:		-
	a) measured values $\geq$ specified values (mm) .....		N/A
	b) measured values $\geq$ specified values (mm) .....		N/A
	c) measured values $\geq$ specified values (mm) .....		N/A

IEC 62031			
Clause	Requirement + Test	Result - Remark	Verdict

ANNEX 2		TABLE: Critical components information					
Object / part No.	Code	Manufacturer/ trademark	Type / model	Technical data	Standard	Mark(s) of conformity <sup>1)</sup>	
Description:							
Plastic Cover (Optional)	C	Chang Chun Plastics Co., Ltd.,	3030	Polybutylene Terephthalate (PBT). Min. 120°C, 1.5 mm thick	IEC/EN 60231 IEC/EN 60838-2-2	Tested with the appliance also UL approved (E59481)	
Metal Clad Board	C	Polytronics	TCB-8	Single layer aluminum metal base.	IEC/EN 62031	Tested with the appliance	
LED	C	Osram	UX3	Max, 48 dies, 3 V per die	IEC/EN 60231	Tested with the appliance	
Phosphor	C	ShinEtsu	LPS-2434	Phosphor	IEC/EN 60231	Tested with the appliance	
Wiring (Internal)	C	Belden Wiring	Style 3266	0.5mm <sup>2</sup> , 300 V, 125°C	IEC/EN 60231	Tested with the appliance and also UL approved (E357312)	
	D	Various	Various	0.5mm <sup>2</sup> , 300 V, 125°C	IEC/EN 60231	Tested with the appliance	
Supplementary information:							
<sup>1)</sup> Provided evidence ensures the agreed level of compliance. See OD-CB2039.							
The codes above have the following meaning:							
A - The component is replaceable with another one, also certified, with equivalent characteristics							
B - The component is replaceable if authorised by the test house							
C - Integrated component tested together with the appliance							
D - Alternative component							

IEC 62031			
Clause	Requirement + Test	Result - Remark	Verdict

<b>ANNEX 3</b>	<b>Screw terminals (part of the luminaire)</b>		-
<b>(14)</b>	<b>SCREW TERMINALS</b>		N/A
(14.2)	Type of terminal.....:		—
	Rated current (A).....:		—
(14.3.2.1)	One or more conductors		N/A
(14.3.2.2)	Special preparation		N/A
(14.3.2.3)	Terminal size		N/A
	Cross-sectional area (mm <sup>2</sup> ).....:		—
(14.3.3)	Conductor space (mm).....:		N/A
(14.4)	Mechanical tests		-
(14.4.1)	Minimum distance		N/A
(14.4.2)	Cannot slip out		N/A
(14.4.3)	Special preparation		N/A
(14.4.4)	Nominal diameter of thread (metric ISO thread) .....	M	-
	External wiring		N/A
	No soft metal		N/A
(14.4.5)	Corrosion		N/A
(14.4.6)	Nominal diameter of thread (mm) .....		N/A
	Torque (Nm) .....		N/A
(14.4.7)	Between metal surfaces		N/A
	Lug terminal		N/A
	Mantle terminal		N/A
	Pull test; pull (N).....:		N/A
(14.4.8)	Without undue damage		N/A

IEC 62031			
Clause	Requirement + Test	Result - Remark	Verdict

<b>ANNEX 4</b>	<b>Screwless terminals (part of the luminaire)</b>		-
<b>(15)</b>	<b>SCREWLESS TERMINALS</b>		N/A
(15.2)	Type of terminal..... :		—
	Rated current (A)..... :		—
(15.3.1)	Material		N/A
(15.3.2)	Clamping		N/A
(15.3.3)	Stop		N/A
(15.3.4)	Unprepared conductors		N/A
(15.3.5)	Pressure on insulating material		N/A
(15.3.6)	Clear connection method		N/A
(15.3.7)	Clamping independently		N/A
(15.3.8)	Fixed in position		N/A
(15.3.10)	Conductor size		N/A
	Type of conductor		N/A
(15.5.1)	Terminals internal wiring		N/A
(15.5.1.1)	Pull test spring-type terminals (4 N, 4 samples) .....		N/A
(15.5.1.2)	Pull test pin or tab terminals (4 N, 4 samples) .....		N/A
	Insertion force not exceeding 50 N		N/A
(15.5.1.2)	Permanent connections: pull-off test (20 N)		N/A
(15.5.2)	Electrical tests		-
	Voltage drop (mV) after 1 h (4 samples)..... :		N/A
	Voltage drop of two inseparable joints		N/A
	Number of cycles:		—
	Voltage drop (mV) after 10th alt. 25th cycle (4 samples)..... :		N/A
	Voltage drop (mV) after 50th alt. 100th cycle (4 samples)..... :		N/A
	After ageing, voltage drop (mV) after 10th alt. 25th cycle (4 samples) .....		N/A
	After ageing, voltage drop (mV) after 50th alt. 100th cycle (4 samples) .....		N/A
(15.6)	Terminals external wiring		N/A
	Terminal size and rating		N/A
(15.6.2.1)	Pull test spring-type terminals or welded connections (4 samples); pull (N) .....		N/A



IEC 62031			
Clause	Requirement + Test	Result - Remark	Verdict
	Pull test pin or tab terminals (4 samples); pull (N) .....		N/A

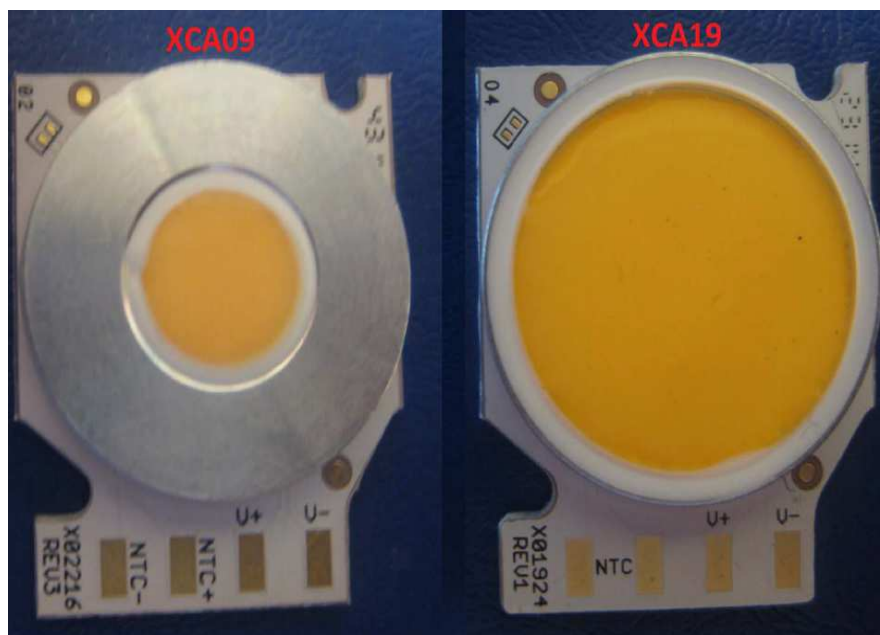
(15.6.3.1)		TABLE: Contact resistance test									N/A
		Voltage drop (mV) after 1 h									—
terminal	1	2	3	4	5	6	7	8	9	10	
voltage drop (mV)											
		Voltage drop of two inseparable joints									
		Voltage drop after 10th alt. 25th cycle									
		Max. allowed voltage drop (mV) ..... :									—
terminal	1	2	3	4	5	6	7	8	9	10	
voltage drop (mV)											
		Voltage drop after 50th alt. 100th cycle									
		Max. allowed voltage drop (mV) ..... :									—
terminal	1	2	3	4	5	6	7	8	9	10	
voltage drop (mV)											
		Continued ageing: voltage drop after 10th alt. 25th cycle									
		Max. allowed voltage drop (mV) ..... :									—
terminal	1	2	3	4	5	6	7	8	9	10	
voltage drop (mV)											
		Continued ageing: voltage drop after 50th alt. 100th cycle									
		Max. allowed voltage drop (mV) ..... :									—
terminal	1	2	3	4	5	6	7	8	9	10	
voltage drop (mV)											
Supplementary information:											

IEC 62031			
Clause	Requirement + Test	Result - Remark	Verdict

<b>Attachment 1</b>	<b>Heating Data</b>
---------------------	---------------------

Cond.	U <sub>n</sub> (V)	F <sub>n</sub> (Hz)	I <sub>n</sub> (A)	P <sub>n</sub> (W)	V <sub>out</sub> (V)	P <sub>out</sub> (W)	I <sub>out</sub> (A)	Operating Condition/Status
1	50	-	1.5	75	-	-	-	Normal Operation (LED Face Up)
2	50	-	1.5	75	-	-	-	Normal Operation (LED Face Down)
Model. ....:						<b>XTM19</b>		--
Temperature Rise dT or Max Temp of Part						Max Temp °C Test Condition No.		Normal Temp Limit max °C
T/C Ch. No.	Monitored point: Per engineer; Only needs to be tested.					No. 1	No. 2	
1	Oven Ambient					40	43	--
2	PWB point					90	89	130
3	Plastic Cover Location 1					73	70	130
4	Plastic Cover Location 2					76	70	130
5	Plastic Cover Location 3					79	74	130
6	Lead terminals, ¼" from termination					66	59	105
7	Tc Location on Thermal Frame					90	90	90

IEC 62031			
Clause	Requirement + Test	Result - Remark	Verdict
Attachment 2		Photos	

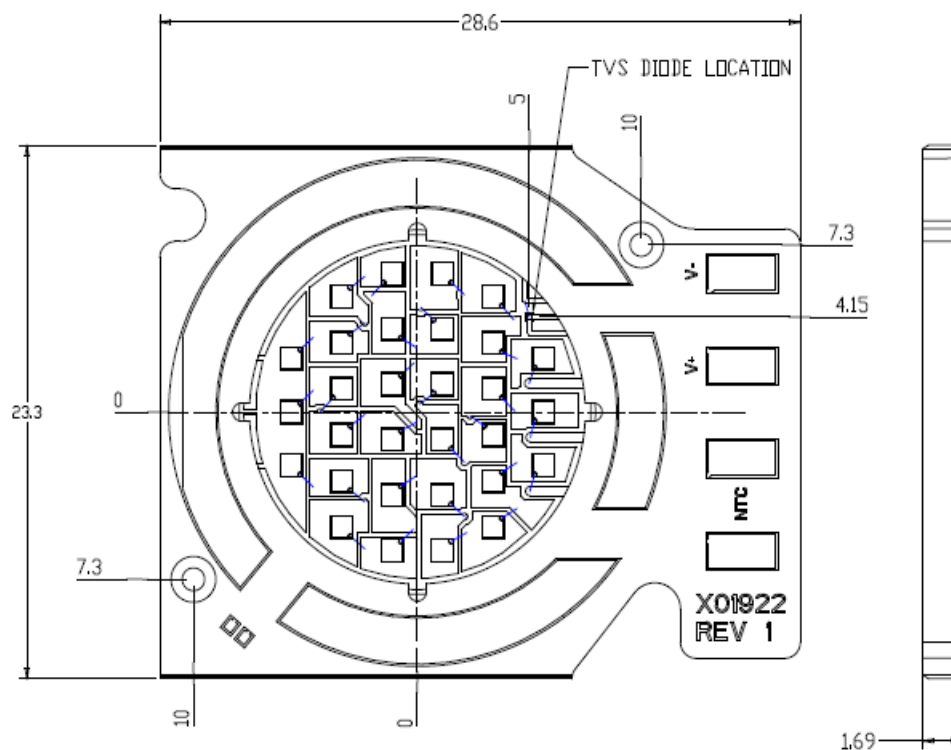


IEC 62031			
Clause	Requirement + Test	Result - Remark	Verdict
Attachment 2	Photos		



IEC 62031			
Clause	Requirement + Test	Result - Remark	Verdict
<b>Attachment 3</b>		Illustrations and Drawings	

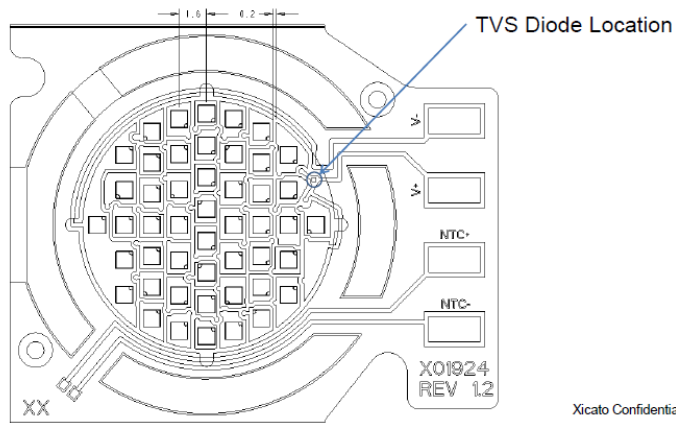
### 19 mm LES Physical Layout



IEC 62031			
Clause	Requirement + Test	Result - Remark	Verdict
<b>Attachment 3</b>		<b>Illustrations and Drawings</b>	

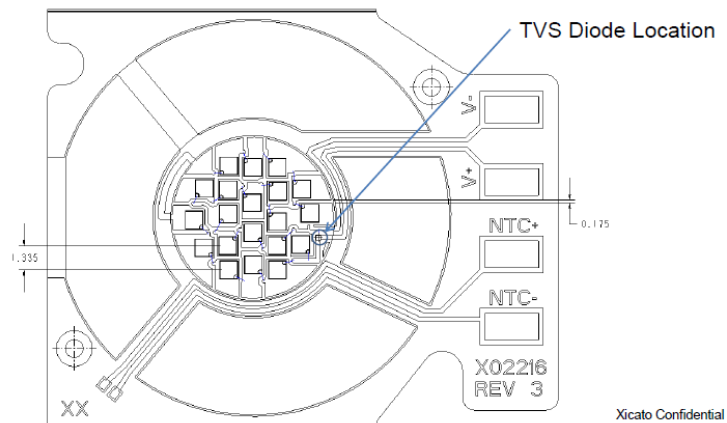
### 48 die 19mm LES Physical Layout

- Alternate Model Nomenclature: XCA19XXVVYYCCW
- 0.2mm minimum trace-to-trace spacing
- LED die-to-die center spacing minimum 1.6mm



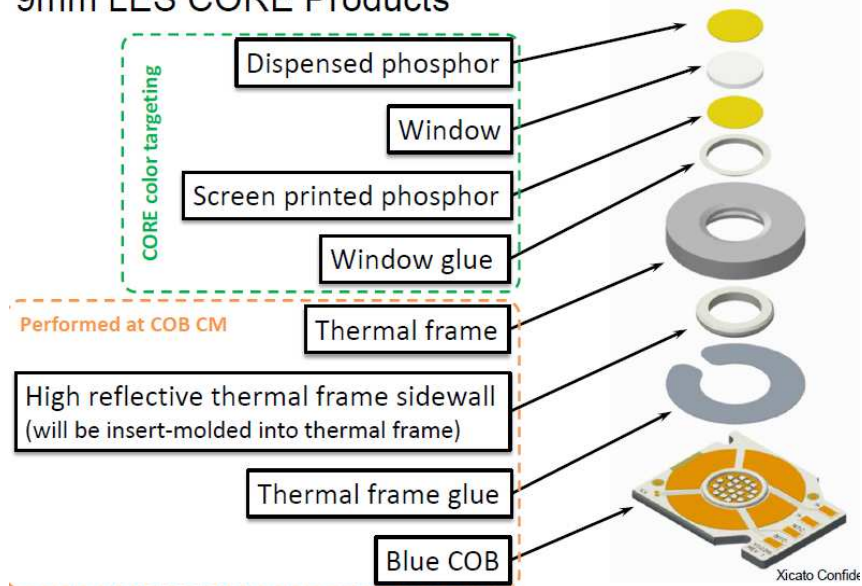
### 20 die 9mm LES Physical Layout

- Alternate Model Nomenclature: XCA09XXVVYYCCW
- 0.175mm minimum trace-to-trace spacing
- LED die-to-die center spacing minimum 1.335mm

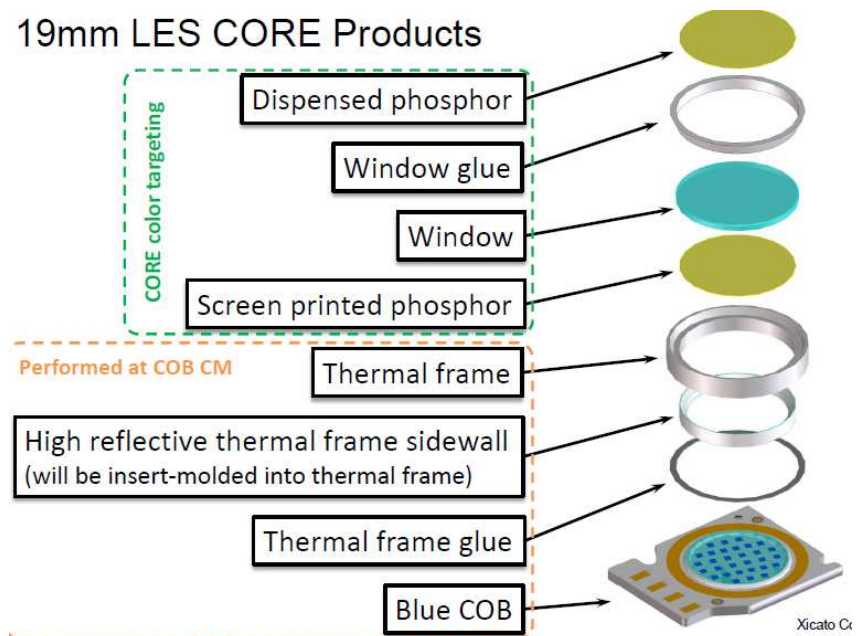


IEC 62031			
Clause	Requirement + Test	Result - Remark	Verdict
<b>Attachment 3</b>		Illustrations and Drawings	

### 9mm LES CORE Products



### 19mm LES CORE Products



IEC 62031			
Clause	Requirement + Test	Result - Remark	Verdict

<b>Attachment 4</b>	<b>Photobiological Report</b>
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## IEC TR 62778 Assessment

Project Number	4786795628
Company Name	Xicato
LED Manufacturer	Xicato
LED Part Number	XTM09954020CCA and XTM19804050CCA
Color Temperatures Assessed	4000K CCT – presents warmer temperatures
LED Drive Current Assessed	1.4Adc to each module

## IEC TR 62778 - ANNEX C

Compliance determined to Table C.1 for each CCT involved: ☐ Yes (does not exceed Risk Group 1) ☒ No

Compliance determined to Table C.2 for each CCT involved: ☐ Yes (does not exceed Risk Group 1) ☒ No

If compliance to Tables C.1 or C.2 cannot be made, testing is necessary per C.3.

Apparent source size >2.2mm?: ☒ Yes – 11mRad test performed at 200mm

☐ No – 11mRad test performed per IEC TR 62778 Cl. 7.2a

The following emissions were measured during 11mRad Radiance test.

Model XTM09954020CCA

Table 6.1 Emission limits for risk groups of continuous wave lamps							
Risk	Action spectrum	Symbol	Units	Emission Measurement			
				Exempt		Low risk	
				Limit	Result	Limit	Result
Blue light	B( $\lambda$ )	L <sub>B</sub>	W•m <sup>-2</sup> •sr <sup>-1</sup>	100	Exceeded	10000	7.388E+03

Model XTM19804050CCA

Table 6.1 Emission limits for risk groups of continuous wave lamps							
Risk	Action spectrum	Symbol	Units	Emission Measurement			
				Exempt		Low risk	
				Limit	Result	Limit	Result
Blue light	B( $\lambda$ )	L <sub>B</sub>	W•m <sup>-2</sup> •sr <sup>-1</sup>	100	Exceeded	10000	6.342E+03

Determined Risk Group: ☐ RG0 ☒ RG1 ☐ RG2

If Risk Group 2, the following applies:

Illuminance E <sub>thr</sub> at RG1/RG2 border	n/a
Distance to E <sub>thr</sub>	n/a



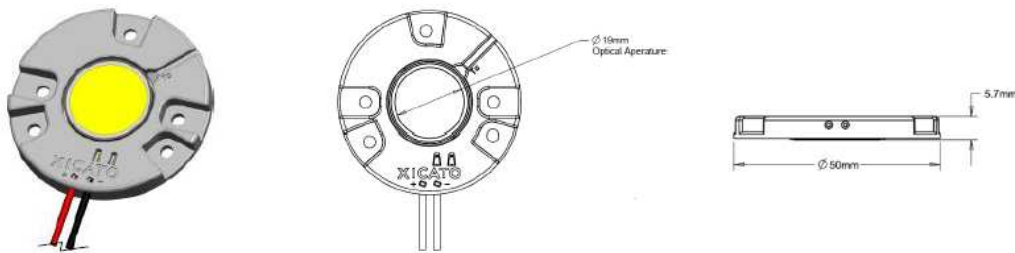
IEC 62031			
Clause	Requirement + Test	Result - Remark	Verdict
<b>Attachment 5</b>		<b>Specification Sheet</b>	

## PRODUCT DATA SHEET

# XICATO

XTM LED Module *with Corrected Cold Phosphor Technology*®

Standard Series



### Specification Features Physical Characteristics

Module Source Type:	Corrected Cold Phosphor LED Module. Dia. 50mm (1.97") x 5.6mm (0.22"). Light emitting surface Ø 19mm (0.75").
Maximum Case Temperature:	90°C
Phosphor Proximity:	Remote
Module Weight:	18 gm (.63 oz). 100 count box. Box weight 3 kg (7lbs). 18 gm (.63 oz). 533mm x 254mm x 153mm (21" x 10" x 6").
Interfaces:	Electrical: 12.7mm stripped tinned 20AWG 300V integrated wire. 400mm (15.7") length. Mechanical: Recommended mounting screws: M3 x 0.5mm x 8mm with split lock washer. Torque 0.4Nm (3.5 in-lb) using three-hole pattern, 0.6Nm (5.3 in-lb) for two-hole pattern. Thermal: Integral thermal pad. A mating thermal interface (i.e. heatsink) surface flatness of ≤0.1 mm and center hole less than Ø12 mm is recommended in order to maintain thermal performance.
Module Housing:	Injection molded 30% glass-filled PBT.
Storage Temperature:	-40°C to 85°C

### Photometric Characteristics

Color Consistency Initial:	1 x 2 MacAdam (1 x 2 SDCM) along BBL.
Color Rendering Index (CRI):	Ra: 83 (typical). Values ±3.
Color Consistency Maintained:	C3/B10/F10 50,000 hrs. (<0.003 Δ u',v' 5 years/44,000 hrs. warranty <sup>11</sup> ).
Lumen Maintenance:	L80/B10/F10 50,000 hrs. (L70, B0, F0 5 years/44,000 hrs. warranty <sup>11</sup> ).

### Other

Regulatory:	UL recognized Class 2, CE (IEC62031, Class III), RoHS 2 compliant. IP20. Photobiological Safety (EN62471:2008), ESD Class 3B (HBM). No special ESD handling procedures required.
Mercury Content	None
UV or IRC Emissions:	None

IEC 62031			
Clause	Requirement + Test	Result - Remark	Verdict
Attachment 5		Specification Sheet	

## PRODUCT DATA SHEET

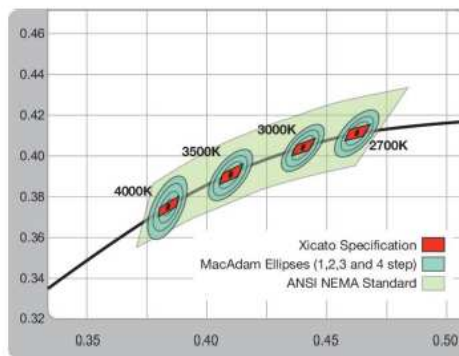
# XICATO

XTM LED Module *with Corrected Cold Phosphor Technology*<sup>®</sup>

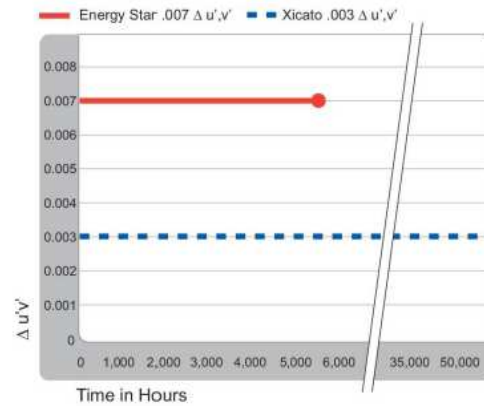
Standard Series

### Color Information

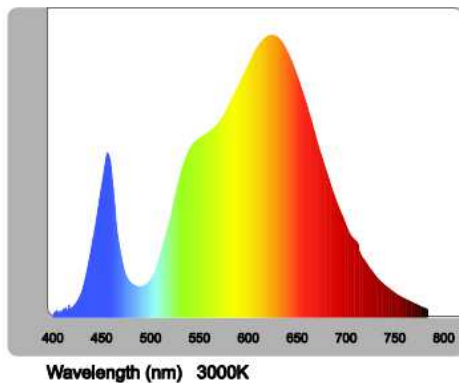
Color Consistency – Initial



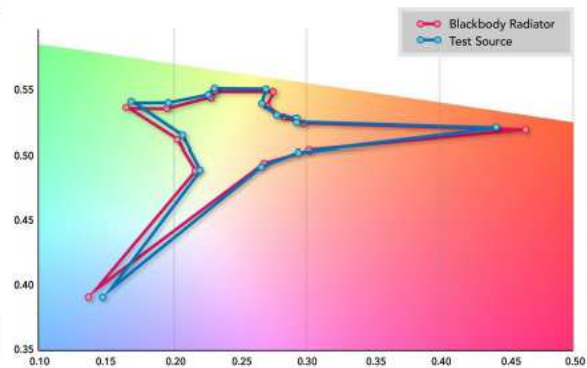
Color Consistency – Maintained



Spectral Power Distribution



Color Gamut



Color Rendering Index (3000K Typical)

	Ra	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14	R15
Standard Series	83	82	89	95	84	82	87	86	65	16	64	79	58	81	93	75

IEC 62031			
Clause	Requirement + Test	Result - Remark	Verdict
Attachment 5		Specification Sheet	

# PRODUCT DATA SHEET

# XICATO

## XTM LED Module *with Corrected Cold Phosphor Technology*<sup>®</sup>

### Standard Series

### Technical Data

Lighting <sup>1</sup>							Electrical (constant current)								
Module	Part Number	Correlated Color Temperature (CCT) <sup>2</sup>	Color Rendering Index (Ra) <sup>3</sup>	Initial Color Consistency			Lumen Maintenance (hrs) <sup>4</sup>	Module	Drive Current (mA) <sup>5, 12</sup>	Forward Voltage <sup>6</sup>			Power Consumption (W) <sup>7</sup>	Lumen Output <sup>8</sup> (Typical) lm	Efficacy (Typical) lm/W
				SDCM	CCT	Duv				Min	Typ	Max			
1300 lm	XTM19802713CCA	2700K	83 ±3	≤1 x 2	± 40K	± 0.001	50k	1300 lm	700	12.6	16.7	18.6	11.7	1300	111
	XTM19803013CCA	3000K			± 50K				500	12.2	16.3	18.1	8.2	965	118
	XTM19803513CCA	3500K			± 60K				350	11.9	15.9	17.8	5.6	720	129
	XTM19804013CCA	4000K			± 70K										
2000 lm	XTM19802720CCA	2700K			± 40K			2000 lm	700	20.1	27.9	31.0	19.5	2000	102
	XTM19803020CCA	3000K			± 50K				500	19.5	27.1	30.2	13.6	1490	110
	XTM19803520CCA	3500K			± 60K				350	19.1	26.5	29.6	9.3	1105	119
	XTM19804020CCA	4000K			± 70K										
3000 lm	XTM19802730CCA	2700K			± 40K			3000 lm	1050	22.6	27.9	31.0	29.3	3000	102
	XTM19803030CCA	3000K			± 50K				700	21.9	27.0	30.1	18.9	2100	111
	XTM19803530CCA	3500K			± 60K				500	21.4	26.4	29.6	13.2	1585	120
	XTM19804030CCA	4000K			± 70K				350	21.0	26.0	29.1	9.1	1195	131
4000 lm	XTM19802740CCA	2700K			± 40K			4000 lm	1400	23.4	27.9	30	39.1	4000	102
	XTM19803040CCA	3000K			± 50K				1050	22.7	27.1	29.2	28.5	3080	108
	XTM19803540CCA	3500K			± 60K				700	22.2	26.5	28.6	18.6	2160	116
	XTM19804040CCA	4000K			± 70K				500	21.7	26.0	28.2	13.0	1630	125
5000 lm	XTM19802750CCA	2700K			± 40K			5000 lm	1400	26.6	33.4	35.7	46.8	5000	107
	XTM19803050CCA	3000K			± 50K				1050	27.7	32.5	35.1	34.1	3850	113
	XTM19803550CCA	3500K			± 60K				700	27.1	31.8	34.3	22.3	2700	121
	XTM19804050CCA	4000K			± 70K				500	26.6	31.2	33.8	15.6	2030	130

1. All lighting data shown in the above table is taken at a recommended operating test point (Tc) temperature of 70°C and highest rated drive current.

2. "3000K" and "3500K" CCTs are 2950K and 3420K, respectively. CCT data ANSINEMA compliant.

3. "Ra" is defined as the average of color rendering indices R1-R8. 3000K data shown. Value is typical.

4. L80 50,000 hrs. Long term testing in process.

5. The module is designed for usage with a constant current power supply with an output current up to 770mA (700mA), 1100mA (1050mA) and 1540mA (1400) max. (including tolerance).

6. Voltage data based on 20°C to 90°C operating range. For operation outside this range, contact Xicato.

7. Power consumption is stated as a typical value that is based on the typical range of forward voltage.

Maximum and minimum power values can be calculated using the voltage range.

8. Absolute range of lumen output is ±10% of typical value.

9. Thermal compatibility classification: Contact Xicato for details.

10. Specifications subject to change without notice.

11. 5 year color and lumen maintenance warranty. Refer to [www.xicato.com](http://www.xicato.com) for details.

12. Maximum peak ripple current with frequencies ≥ 100Hz for each product are 2000mA (1300lm), 2000mA (2000lm).

IEC 62031			
Clause	Requirement + Test	Result - Remark	Verdict
Attachment 5	Specification Sheet		

## PRODUCT DATA SHEET

# XICATO

XTM LED Module *with Corrected Cold Phosphor Technology*®

Standard Series

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### Recommended LED Module in Luminaire Specification

Physical Characteristics: LED module shall be remote phosphor, nominal 50mm (1.97") diameter.

Performance: LED module shall have a CRI (Ra) 83. CRI values shall be  $\pm 3$  points initial. LED module color points shall be within 1 x 2 SDCM initial. Flux output shall be measured at a minimum of 70 °C ( $\pm 5^\circ\text{C}$ ).

General Requirements: LED module shall be UL recognized, CE compliant and RoHS compliant. Module shall be warranted for 5 years for catastrophic failure, lumen maintenance ( $\geq L70$ ), and color consistency ( $< .003 \Delta u', v'$ ). LED module shall be Xicato Module. # \_\_\_\_\_

### About Xicato

Xicato is passionate about light. Light has an emotional effect on people and a direct impact on business profitability. It ultimately influences everything in our lives. Xicato is a recognized leader in creating LED modules that provide superior aesthetics, economics and durability. Xicato aspires to be the trusted partner of the global lighting design community and luminaire manufacturers.

For an overview of our customers' luminaires visit [www.xicato.com](http://www.xicato.com).



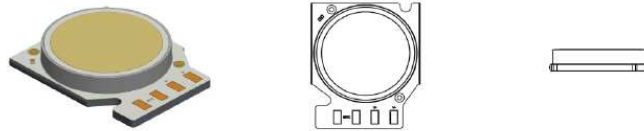
IEC 62031			
Clause	Requirement + Test	Result - Remark	Verdict
<b>Attachment 5</b>		<b>Specification Sheet</b>	

## PRODUCT DATA SHEET

# XICATO

XCA LED Module Array *with Corrected Cold Phosphor Technology*<sup>®</sup>

Standard Series



### Specification Features<sup>9</sup>

#### Physical Characteristics

Module Array Source Type:	Corrected Cold Phosphor LED Module Array. Light emitting surface Ø 19mm (0.75").
Maximum Case Temperature:	90°C
Phosphor Proximity:	Remote
Module Array Weight:	6 gm (.21 oz). 100 count box. Box weight .9 kg (2lbs). 45cm x 35cm x 5cm (18" x 14" x 2").
Dimensions:	Dimensions subject to change without notice. Refer to Interface Drawing 5005-00X0-2019 for further information.
Interfaces:	Electrical: Gold plated contacts for solder or spring contact connection. Mechanical: Either thermal adhesive or clamp mechanism (i.e. 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 vent). Electrical contacts may be selectively coated for electrical isolation, but coating shall not come in contact with LES or metal ring surrounding LES. Thermal: Thermal interface material required between XCA and mounting surface. For effective thermal management, Xicato recommends that the heat sink have a surface flatness ≤0.1mm and no center hole. In cases where a center hole is used, Xicato recommends the hole diameter be less than 12mm to allow the heat sink to dissipate heat away from the XCA effectively.
Storage Temperature:	-40°C to 85°C

#### Photometric Characteristics

Color Consistency Initial:	1 x 2 MacAdam (1 x 2 SDCM) along BBL.
Color Rendering Index (CRI):	Ra: 83 (typical). Values ±3.
Color Consistency Maintained:	C3/B10/F10 50,000 hrs. (<0.003 Δu',v' 5 years/44,000 hrs. warranty <sup>10</sup> ).
Lumen Maintenance:	L80/B10/F10 50,000 hrs. (L70, B0, F0 5 years/44,000 hrs. warranty <sup>10</sup> ).

#### Other

Regulatory:	UL recognized Class 2, CE (IEC62031, Class III), RoHS 2 compliant. IP20. Photobiological Safety (EN62471:2008), ESD Class 3B (HBM). No special ESD handling procedures required.
Mercury Content	None
UV or IRC Emissions:	None

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<b>Attachment 5</b>		Specification Sheet	

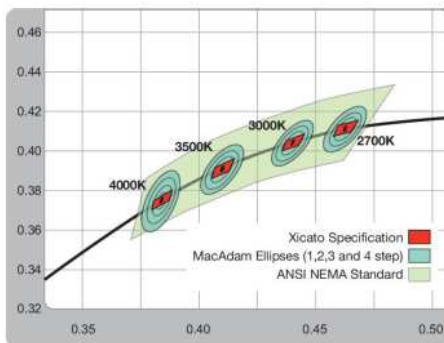
## PRODUCT DATA SHEET

# XICATO

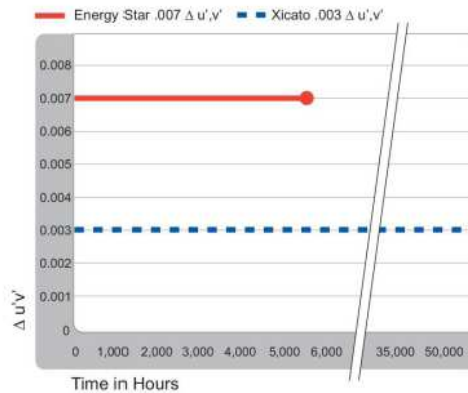
XCA LED Module Array with Corrected Cold Phosphor Technology<sup>®</sup>  
Standard Series

### Color Information

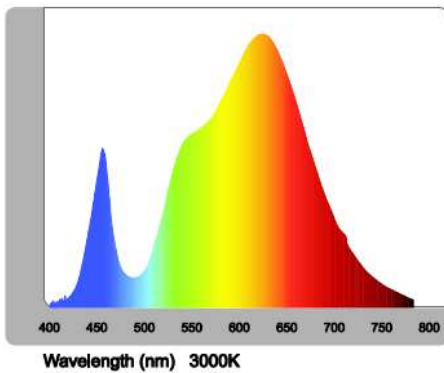
Color Consistency – Initial



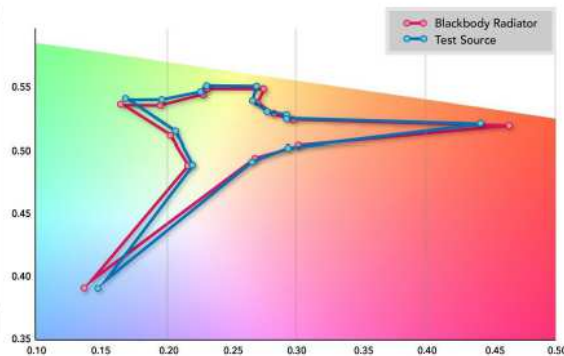
Color Consistency – Maintained



Spectral Power Distribution



Color Gamut



Color Rendering Index (3000K Typical)

	Ra	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14	R15
Standard Series	83	82	89	95	84	82	87	86	65	16	64	79	58	81	93	75

IEC 62031			
Clause	Requirement + Test	Result - Remark	Verdict

**Attachment 5****Specification Sheet**

# PRODUCT DATA SHEET

# XICATO

## XCA LED Module Array with Corrected Cold Phosphor Technology<sup>®</sup>

### Standard Series

### Technical Data

**Technical Data**

Lighting <sup>1</sup>							Electrical (constant current)								
Module	Part Number	Correlated Color Temperature (CCT) <sup>2</sup>	Color Rendering Index (Ra) <sup>3</sup>	Initial Color Consistency			Lumen Maintenance (hrs) <sup>4</sup>	Module	Drive Current (mA) <sup>5, 11</sup>	Forward Voltage <sup>6</sup>			Power Consumption (W) <sup>7</sup>	Lumen Output <sup>8</sup> (Typical)	Efficacy (Typical)
				SDCM	CCT	Duv				Min	Typ	Max			
1300 lm	XCA19802713CCA	2700K	83 ±3	≤1 x 2	± 40K	± 0.001	50k	1300 lm	700	12.6	16.7	18.6	11.7	1300	111
	XCA19803013CCA	3000K			± 50K				500	12.2	16.3	18.1	8.2	965	118
	XCA19803513CCA	3500K			± 60K				350	11.9	15.9	17.8	5.6	720	129
	XCA19804013CCA	4000K			± 70K										
2000 lm	XCA19802720CCA	2700K			± 40K			2000 lm	700	20.1	27.9	31.0	19.5	2000	102
	XCA19803020CCA	3000K			± 50K				500	19.5	27.1	30.2	13.6	1490	110
	XCA19803520CCA	3500K			± 60K				350	19.1	26.5	29.6	9.3	1105	119
	XCA19804020CCA	4000K			± 70K										
3000 lm	XCA19802730CCA	2700K			± 40K			3000 lm	1050	22.6	27.9	31.0	29.3	3000	102
	XCA19803030CCA	3000K			± 50K				700	21.9	27.0	30.1	18.9	2100	111
	XCA19803530CCA	3500K			± 60K				500	21.4	26.4	29.6	13.2	1585	120
	XCA19804030CCA	4000K			± 70K				350	21.0	26.0	29.1	9.1	1195	131

1. All lighting data shown in the above table is taken at a recommended operating test point (Tc) temperature of 70°C and highest rated drive current.

2. "3000K" and "3500K" CCT's are 2950K and 3420K, respectively. CCT data ANSINEMA compliant.

3. "Ra" is defined as the average of color rendering indices R1-R8. 3000K data shown. Value is typical.

4. L80 50,000 hrs. Long term testing in process.

5. The module is designed for usage with a constant current power supply with an output current up to 770mA (700mA), 1100mA (1050mA) and 1540mA (1400) max. (including tolerance).

6. Voltage data based on 20°C to 90°C operating range. For operation outside this range, contact Xicato.

7. Power consumption is stated as a typical value that is based on the typical range of forward voltage.

Maximum and minimum power values can be calculated using the voltage range.

8. Absolute range of lumen output is ±10% of typical value.

9. Specifications subject to change without notice.

10. 5 year color and lumen maintenance warranty. Refer to [www.xicato.com](http://www.xicato.com) for details.

11. Maximum peak ripple current with frequencies ≥ 100hz for each product are 2000mA (1300lm & 2000lm), 3000mA (3000lm)

# PRODUCT DATA SHEET

# XICATO

## XCA LED Module Array with Corrected Cold Phosphor Technology<sup>®</sup>

### Standard Series

### About Xicato

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For an overview of our customers' luminaires visit [www.xicato.com](http://www.xicato.com).

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**Appendix 1: IEC 60838-2-2 – LED connector**

<b>3</b>	<b>GENERAL REQUIREMENTS</b>		<b>P</b>
	Connectors for LED-modules shall be so designed and constructed that in normal use they function reliably and cause no danger to persons or surroundings		P
	Compliance is checked by the tests specified		P

<b>4</b>	<b>GENERAL CONDITIONS FOR TESTS</b>		<b>P</b>
4.1	Tests according to this standard and type tests		
	The tests of 16.1, 16.2 and 19 are carried out on three additional specimens for each test		
4.2	Tests are made at an ambient temperature of 20° C ± 5° C, unless otherwise specified, and with the holder in the most unfavourable position for normal use		P

<b>5</b>	<b>STANDARD RATINGS</b>		<b>P</b>
5.1	Maximum rated voltage is 50 V a.c.		P
5.2	Rated current:		P
	– minimum 10 mA		P
	– maximum 3 A		P
5.3	The rated operating temperature range is -30°C to +65°C		P
	The lower value has to be complied with by all systems unless they are restricted to indoor use only		P

<b>6</b>	<b>CLASSIFICATION</b>		<b>P</b>
6.1	Unenclosed connectors for LED-modules		P
	Enclosed connectors for LED-modules		N/A
	Independent connectors for LED-modules		N/A
6.2	Rated operating temperatures up to and including 80°C		N/A
	T-marked connectors for LED-modules (> 80°C)		P



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6.3	Connectors for LED-modules with switch for energy steering		N/A
	Connectors for LED-modules without switch		P

<b>7</b>	<b>MARKING</b>		<b>P</b>
7.1	Connectors for LED-modules marked with:		P
	a) mark of origin	XICATO	P
	b) unique catalogue number or identifying reference	XTM 19	P
7.2	The following information given on the connectors for LED-modules or available in manufacturer's catalogue:		P
	a) the rated voltage in volts, if applicable		P
	b) the rated current in amperes		P
	c) the rated operating temperature "T", if greater than 80° C, in steps of 10° C		P
	d) the conductor sizes for which the terminals are designed		P
	Required symbol used:		P
	– for voltage		P
	– for current		P
	– for wattage		N/A
	For connectors for LED-modules in equipment where a higher degree of availability is expected, distances for impulse withstand category III may be applicable. This information has to be indicated in the manufacturer's catalogue or the like		N/A
7.3	The instructions supplied contain the information required to ensure correct mounting and operation of the connectors for LED-modules		P
7.4	The marking according to 7.1 and 7.2 durable and legible:		P
	– after test with water, 15 s		P
	– after test with petroleum spirit, 15 s		P

<b>8</b>	<b>PROTECTION AGAINST ELECTRIC SHOCK</b>		<b>N/A</b>
8.1	Enclosed connectors for LED-modules are so constructed that, when they are been built-in or installed and wired as in normal use, their live parts are not accessible:		N/A
	– without a LED inserted		N/A
	– with the appropriate LED inserted		N/A

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	– during insertion or removal of the LED		N/A
	Compliance checked with standard test finger of IEC 60529		N/A

<b>9</b>	<b>TERMINALS</b>		<b>P</b>
	The Connectors for LED-modules provided with:		P
	– terminals with screw clamping		N/A
	– screwless terminals of spring or wedge type		P
	– tabs or pins for push-on connections		N/A
	– posts for wire wrapping		N/A
	– soldering lugs		P
	– connecting leads (tails)		P
	Terminal screws and nuts have a metric thread		N/A
	The screwless terminals satisfactory with both rigid conductors and flexible cables or cords		P
	Other means of connection		N/A
9.2	Terminals with screw clamping comply with the requirements of clause 14 of IEC 60598-1	see annex 1	N/A
	Screwless terminals of spring or wedge type comply with the requirements of clause 15 of IEC 60598-1	see annex 2	N/A
	Tabs or pins for push-on connections comply with the requirements of clause 15 of IEC 60598-1	see annex 2	N/A
	Posts for wire wrapping comply with the requirement in IEC 60352-1		N/A
	Soldering lugs comply with relevant requirements in IEC 60068-2-20		P
	Connecting leads (tails) comply with the requirements of 9.3		N/A
9.3	Connecting leads connected by:		P
	– soldering		P
	– welding		N/A
	– crimping		N/A
	Insulation of the leads complying with IEC 60227 or IEC 60245 or subclause 5.3 in IEC 60598-1		P
	Pull test: see clause 16		P

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<b>10</b>	<b>PROVISION FOR EARTHING</b>		<b>N/A</b>
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<b>11</b>	<b>CONSTRUCTION</b>		<b>P</b>
11.1	Wood, cotton, silk, paper and similar materials not allowed as insulation unless suitably impregnated		P
	Lacquer or enamel are not deemed to provide insulation		N/A
	Minimum cross-sectional area for the connecting leads is 0.22 mm <sup>2</sup>		P
	Minimum cross-sectional area for flat cables (ribbon cables) is 0.09 mm <sup>2</sup>		N/A
11.2	Connectors for LED-modules dimensions comply with relevant IEC standard		
11.4	Contacts and all other current-carrying parts are so constructed as to prevent excessive temperature rise		P
	Test for 1h with 1.25 times rated current. Temperature rise does not exceed 45 K		P

<b>12</b>	<b>MOISTURE RESISTANCE, INSULATION RESISTANCE AND ELECTRIC STRENGTH</b>		<b>P</b>
12.1	Humidity treatment for 48h		P
	No damage to the connectors for LED-modules		P
12.2	The insulation resistance and the electric strength of the connectors for LED-modules shall be adequate		P
12.2.1	Minimum insulation resistance at 500 V d.c.:		P
	– between live parts of different polarity		N/A
	– between live parts connected together and external metal parts intended to be earthed		P
	– between such live parts and external metal parts, including fixing screws and metal foil		P
12.2.2	Electric strength test for 1 min:		P
	– between live parts of different polarity		N/A
	– between live parts connected together and external metal parts intended to be earthed		P
	– between such live parts and external metal parts, including fixing screws and metal foil		P

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Clause	Requirement + Test	Result - Remark	Verdict

	For connectors for LED-modules with a rated voltage up to and including 50 V, the test voltage is 500 V		P
	Between the contacts of Connectors for LED-modules, the test voltage is twice the working voltage		P
	For all other cases, the test voltage is $2U + 1000$ V		N/A
	No flash-over or breakdown occurs		P
	Test for earth continuity according to 10.2		N/A

<b>13</b>	<b>MECHANICAL STRENGTH</b>		<b>P</b>
	Impact test, 4 blows applied by pendulum apparatus according to fig. D.1:		P
	– ceramic parts (100 mm)		N/A
	– other materials (150 mm)		P
	No serious damage		P
	Creepage distances and clearances not reduced below values of clause 15		P

<b>14</b>	<b>SCREWS, CURRENT-CARRYING PARTS AND CONNECTIONS</b>		<b>P</b>
	Screws, current-carrying parts and mechanical connections shall withstand mechanical stress occurring in normal use		P
	Compliance with 4.11 and 4.12 of IEC 60598-1		P

<b>15</b>	<b>CREEPAGE DISTANCES AND CLEARANCES</b>		<b>P</b>
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<b>16</b>	<b>ENDURANCE</b>		<b>P</b>
16.1	Connectors for LED-modules shall be capable of maintaining good electrical contact to the module during rapid change of temperature		P
	100 cycles temperature change test		P
	At the end of the test, the connector for LED-modules shows:		P
	– no reduction of protection against electric shock		P
	– no loosening of electrical contacts		P
	– no cracks, swelling or shrinking		P
16.2	Connectors for LED-modules with good electrical contact to the module (6 cycles damp heat test)		P

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Clause	Requirement + Test	Result - Remark	Verdict
16.3	Resistance of connector contacts		P
	The resistance of contacts and connections does not exceed $0,045 \Omega + (A \times n)$ :		P
	a) after 100 cycles temperature change test		
	b) after 6 cycles damp heat test		P
	Pull test for connecting leads with 20 N for 1 min according to 9.3		P
17	<b>RESISTANCE TO HEAT AND FIRE</b>		P
17.1	External parts of insulating material providing protection against electric shock and parts of insulating material retaining live parts or ELV parts in position shall be resistant to heat		P
	Ball-pressure test at $25^\circ\text{C} \pm 5^\circ\text{C}$ above the operating temperature, with a minimum of $125^\circ\text{C}$ for parts retaining live parts in position		P
	Diameter of impression not exceeding 2 mm		P
17.2	Parts of insulating material retaining live parts in position and external parts of insulating material providing protection against electric shock shall be resistant to flame and ignition.		P
17.3	Glow-wire test $650^\circ\text{C}$ on parts providing protection against electric shock, including those with a conductive exterior and parts of insulating material retaining ELV parts in position		P
	Any flame or glowing extinguished within 30 s, and any flaming drops do not ignite tissue paper		P
17.4	Needle-flame test 10 s on parts retaining live parts in position or ELV lamp contacts in position		N/A
	Any self-sustaining flame extinguished within 30 s, and any flaming drops do not ignite tissue paper		P
17.5	Tracking test on parts retaining live parts or ELV parts in position of drip-proof Connectors for LED-modules		N/A
	Connectors for LED-modules withstands 50 drops without failure at PT1 175		N/A
17.6	The resistance to heat of insulating material and/or outer parts of the connectors for LED-modules is tested 168 h in a heating cabinet		P
	$115^\circ\text{C} \pm 5^\circ\text{C}$ or		N/A
	$(T + 35)^\circ\text{C} \pm 5^\circ\text{C}$ by T-marked connectors for LED-modules		P

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Clause	Requirement + Test	Result - Remark	Verdict

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Clause	Requirement + Test	Result - Remark	Verdict
	This test is not made on connectors for LED-modules which are integral with the luminaire as a similar test is already given in IEC 60598-1.		N/A
	At the end of the test, the connectors for LED-modules shows		P
	– no reduction of protection against electric shock		P
	– no loosening of electrical contacts		P
	– no cracks, swelling or shrinking		P
	– compliance with the gauges of IEC 60061-3 as far as they exist		N/A
	The connectors for LED-modules withstands the mechanical strength test in 13, the height of fall being reduced to 50 mm		P
	The sealing compound does not flow to such an extent that live parts are exposed		P
<b>18</b>	<b>RESISTANCE TO EXCESSIVE RESIDUAL STRESSES (SEASON CRACKING) AND TO RUSTING</b>		<b>P</b>
18.1	Contacts and other parts of copper or copper alloy do not show any cracks after the 24 h test in a cabinet with ammonium chloride solution, inspected at an optical magnification of 8x		P
18.2	Ferrous parts, the rusting of which may endanger the safety of the holder, shall be adequately rust-protected		P
<b>19</b>	<b>VIBRATIONS</b>		<b>N/A</b>
19.1	Connectors for LED modules shall be capable to satisfactorily maintain electrical contact to the module when affected to vibration in normal use		N/A
	Vibration test in accordance to IEC 60068-2-6 with 5 sweep cycles (10-500 Hz, 5 g, each axis) for 2 h		N/A
	After vibration test contact making is still present		N/A

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Clause	Requirement + Test	Result - Remark	Verdict

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Clause	Requirement + Test	Result - Remark	Verdict
	<b>ANNEX 2: screw terminals (IEC 60598-1)</b>		<b>N/A</b>
<b>(14)</b>	<b>SCREW TERMINALS</b>		<b>N/A</b>
(14.2)	Type of terminal.....:		N/A
	Rated current (A).....:		N/A
(14.3.2.1)	One or more conductors		N/A
(14.3.2.2)	Special preparation		N/A
(14.3.2.3)	Terminal size		N/A
	Cross-sectional area (mm²).....:		N/A
(14.3.3)	Conductor space (mm).....:		N/A
(14.4)	Mechanical tests		N/A
(14.4.1)	Minimum distance		N/A
(14.4.2)	Cannot slip out		N/A
(14.4.3)	Special preparation		N/A
(14.4.4)	Nominal diameter of thread (metric ISO thread) .....		N/A
	External wiring		N/A
	No soft metal		N/A
(14.4.5)	Corrosion		N/A
(14.4.6)	Nominal diameter of thread (mm).....:		N/A
	Torque (Nm).....:		N/A
(14.4.7)	Between metal surfaces		N/A
	Lug terminal		N/A
	Mantle terminal		N/A
	Pull test; pull (N).....:		N/A
(14.4.8)	Without undue damage		N/A

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Clause	Requirement + Test	Result - Remark	Verdict

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Clause	Requirement + Test	Result - Remark	Verdict
	<b>ANNEX 3: screwless terminals (IEC 60598-1)</b>		<b>N/A</b>
<b>(15)</b>	<b>SCREWLESS TERMINALS</b>		<b>N/A</b>
(15.2)	Type of terminal.....		
	Rated current (A) .....		
(15.3.1)	Material		N/A
(15.3.2)	Clamping		N/A
(15.3.3)	Stop		N/A
(15.3.4)	Unprepared conductors		N/A
(15.3.5)	Pressure on insulating material		N/A
(15.3.6)	Clear connection method		N/A
(15.3.7)	Clamping independently		N/A
(15.3.8)	Fixed in position		N/A
(15.3.10)	Conductor size		N/A
	Type of conductor		N/A
(15.5.1)	Terminals internal wiring		N/A
(15.5.1.1)	Pull test spring-type terminals (4 N, 4 samples).....		N/A
(15.5.1.2)	Pull test pin or tab terminals (4 N, 4 samples).....		N/A
	Insertion force not exceeding 50 N		N/A
(15.5.2)	Permanent connections: pull-off test (20 N)		N/A
(15.6)	Electrical tests		N/A



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Clause	Requirement + Test	Result - Remark	Verdict
(15.8.1)	Pull test spring-type terminals or welded connections (4 samples); pull (N) :		N/A
	Pull test pin or tab terminals (4 samples); pull (N) .....		N/A

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Clause	Requirement + Test	Result - Remark	Verdict

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Clause	Requirement + Test	Result - Remark	Verdict
	<b>ANNEX 3: screwless terminals (IEC 60598-1)</b>		N/A
(15.9)	Contact resistance test		N/A
	Voltage drop (mV) after 1 h		N/A
terminal			
voltage drop (mV)			
	Voltage drop of two inseparable joints		
	Voltage drop after 10th alt. 25th cycle		
	Max. allowed voltage drop (mV) .....		
terminal			
voltage drop (mV)			
	Voltage drop after 50th alt. 100th cycle		
	Max. allowed voltage drop (mV) .....		
terminal			
voltage drop (mV)			
	Continued ageing: voltage drop after 10th alt. 25th cycle		
	Max. allowed voltage drop (mV) .....		
terminal			
voltage drop (mV)			
	Continued ageing: voltage drop after 50th alt. 100th cycle		
	Max. allowed voltage drop (mV) .....		
terminal			
voltage drop (mV)			