

PRELIMINARY DATA SHEET

Xicato Relay Node (XRN)



Figure 1: Xicato Relay Node (XRN) is available in black or white housing.

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, Japan, 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:

- Datasheets
- Test reports, including third party LM-80, UL, CE, and FCC
- Accessory selection tools for heatsinks, optics, and drivers
- CAD files and drawings
- IES files
- Application and Technical Notes
- Training presentations
- Sales brochures
- Technical whitepapers
- ... and much more

Go to the Xicato website under Support / Documents and Tools, or contact your local Xicato representative for more information

TABLE OF CONTENTS

Xicato Relay Node (XRN)	1
About This Document	2
Table of Contents	2
Table of Figures	2
General Description	3
Features	3
Ordering Guide	4
Warranty	4
Mechanical, Electrical and Wireless Specifications	5
Wireless Specifications	7
Firmware Specifications	7
Internal Sensor Data Collection & Storage	7
Mechanical Drawings	8
Regulatory & Agency Approvals	9

TABLE OF FIGURES

Figure 1: Xicato Relay Node (XRN) is available in black or white housing.	1
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GENERAL DESCRIPTION

XICATO RELAY NODE (XRN)

Xicato Relay Nodes are compact, DC-powered, wireless Bluetooth nodes that allow users to extend the reach of Bluetooth networks used for lighting control, environmental monitoring, or other building management applications. XRN allows integrators and users to create mesh networks, extend the network into remote corners or across large spaces while minimizing the need for gateways and ancillary equipment.

XRN can also be used as standalone DC-powered iBeacon, Eddystone or Alt Beacon nodes for indoor location-based services such as indoor positioning, wayfinding, or localized information delivery.

XRN receives Bluetooth mesh messages and checks the Time-To-Live (TTL) value. If the value is zero ($TTL = 0$), the message is ignored (dropped). If the value is greater than zero ($TTL > 0$), XRN decrements the TTL value by one ($TTL = TTL - 1$) and retransmits the packet. XRN is network-specific – it performs this function for all messages that it receives that are in its provisioned network.

FEATURES

EASY TO POWER, EASY TO PROVISION

XRN is a low-power, low-voltage product that operates at 12V to 48V DC input, for group or individual power from inexpensive, readily-available power supply units. Provisioning is fast and easy using Xicato Control Panel (XCP) or through the Xicato Intelligent Gateway (XIG): simply program a unique NodeID, Network and Name and apply power.

THERMAL FOLDBACK AND SHUTOFF

XRN contains internal sensors that detect the temperature of the internal electronics, and which ensure long life by reducing current output in the event that the temperature exceeds the rated temperature of the components. If, after reducing output, the temperature continues to exceed the maximum rating, the XRN automatically shuts off to preserve module lifetime, and to allow the user to troubleshoot the installation.

BLUETOOTH® CONTROL

XRN communicates wirelessly using Bluetooth Low Energy (Bluetooth v4.2), relaying messages between lighting nodes, sensors, switches, gateways, and mobile devices. XRN recognizes messages encrypted by its own valid AES-128 key, and if $TTL > 0$, decrements the message TTL value and repeats it securely into the Bluetooth mesh network. It performs no other processing of the message.

WIRELESS DATA REPORTING

XRN regularly transmits its temperature, input power (W), input voltage, and total operating hours, allowing proactive maintenance. It also stores a histogram of temperature for the life of the device, which can be downloaded on request from an application for lifecycle analysis and confirmation of warranty compliance. Among other things, this allows Xicato to verify its product warranty, and allows users to plan replacement intervals well in advance.

BLUETOOTH BEACONS

XRN can broadcast Apple iBeacons, Eddystone URI beacons, and/or Alt Beacons, enabling a wide variety of location-based information and navigation services.

BLE beacons can act as indoor GPS satellites, allowing mobile apps to provide highly granular, accurate location of users in retail shops, hotels, restaurants, museums, airports, or other public and commercial spaces.

Beacons can also trigger web searches, information screens, or other application responses based on a user's proximity to exhibits, merchandise, or other points of interest.

Transmission power for XID beacons, operational data, and other data can be programmed independently. Users can set both advertising frequency and power levels, depending on their specific application requirements.

ORDERING GUIDE

XRN NUMBERING CONVENTION

Product	Form	Input Voltage	Radio type
XRN	BK1 = black v1 WT1 = white v1	D5 = DC 12-48V	BH = Bluetooth 8.0 dBm

ORDER CODES

Part Number ¹	Description
XRN-BK1-D5-BH	Xicato Relay Node, black, 12- 48V DC input, Bluetooth 8.0 dBm
XRN-WT1-D5-BH	Xicato Relay Node, white, 12- 48V DC input, Bluetooth 8.0 dBm

Notes:

- Wire harnesses are not included with the part numbers listed. They are widely available, off the shelf, TE Connectivity products and must be ordered separately. Xicato will carry these as a convenience to our customers.

WARRANTY

Warranty duration:	5 years Temperature and power parameters must be kept within recommended specifications.
Warranty coverage:	Covers electronics on EVERY module (B0). No failures.
Full warranty text at:	www.xicato.com/support/warranty

MECHANICAL, ELECTRICAL AND WIRELESS SPECIFICATIONS

XRN-xx1-D5-BH	
	 (also available in white)
Housing	Injection molded glass filled PBT
Dimensions (main body)	51 x 36.4 x 26.7 mm (2.0 x 1.4 x 1.1 in)
Weight	22 grams
Physical Mount	Base screws to solid surface; top snaps onto base.
Electrical Connection	Molex 1041880210 2-wire poke-in. 18-24 AWG solid, 20-22 AWG stranded
Input Voltage Settings	12V to 56V DC
Electrical Protection	Inrush over-current and over-voltage protection. Sustained over-voltage protection via non-replaceable fuse.
Idle-State Power Consumption	< 300mW
On-board Sensors	Temperature, Input voltage, Input voltage ripple
Ingress Protection	IP20

RECOMMENDED OPERATING LIMITS¹

	XRN-xx1-D5-BH	Notes
Input Voltage range	12V to 48V DC	2
Ambient Operating Temperature	0°C to +40°C	
Relative Humidity	15% to 85% (non-condensing)	

Notes:

1. For indoor use only
2. Input voltage must be supplied by an SELV (CE) or Class 2 (UR/CNR) power supply to ensure compliant operation with CE or UL safety requirements respectively.

ABSOLUTE LIMITS

	XRN-xx1-D5-BH	Notes
Minimum Input Voltage	12V	1, 2, 3
Maximum Input Voltage	56V	3
Maximum Input Current	15mA	
Input Power Factor (PF)	1	
Ambient Operating Temperature Ta	0°C to +40°C	
Storage Temperature	-40°C to +60C	

Notes:

1. Voltage values listed are those used by the internal voltage measurement circuitry of the XRN. Actual voltage applied on device pins may need to be higher.
2. Input voltage must be supplied by an SELV (CE) or Class 2 (UR/CNR) power supply to ensure compliant operation with CE or UL safety requirements, respectively.
3. Exceeding the maximum input voltage may cause permanent damage to the XRN.

PROGRAMMING

Over the air programming via Bluetooth using Xicato Control Panel (XCP) software running on a Windows or macOS computer, or using the Xicato Intelligent Gateway (XIG). The wired connection is for DC power only.

WIRELESS SPECIFICATIONS

Feature	Specification
Wireless Protocol	Bluetooth 5
Wireless Spectrum	2.4 GHz ISM band
Bandwidth	1 Mbps (Bluetooth 4.x or 5.x)
Channels	40
Transmit Power	Configurable -10dBm to +8 dBm (1 dBm increments)
Receive Sensitivity	-95 dBm (Bluetooth 4.x)
RSSI Resolution	1 dBm

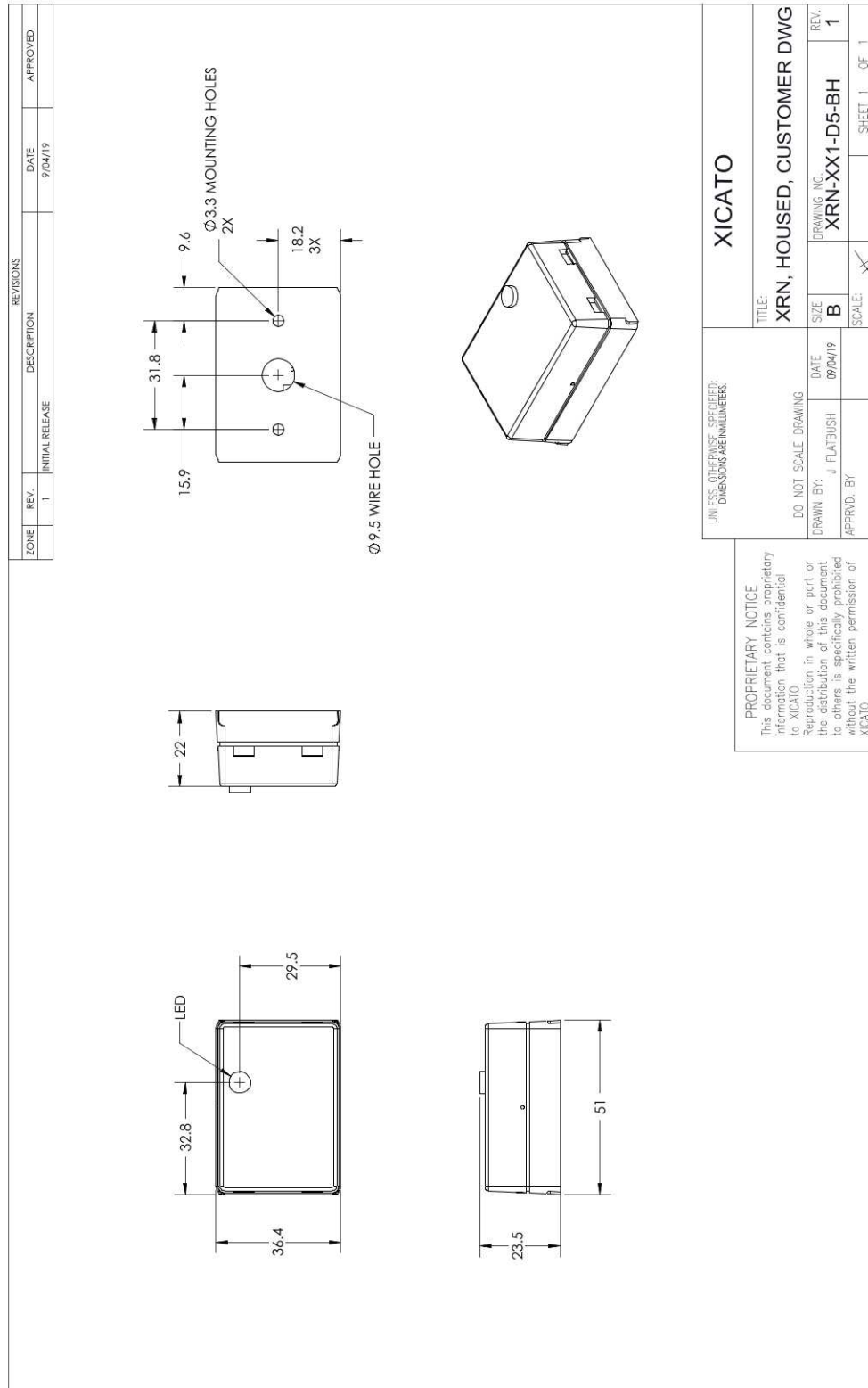
FIRMWARE SPECIFICATIONS

Feature	Specification
Site Scalability	Over 140 trillion individually addressable nodes (2^{37})
Maximum # of Secure Network Zones	Over 4 billion (2^{32}) secure networks. Secure networks cannot overlap.
Maximum devices per secure network	32,767 ($2^{15}-1$) per secure network. One secure network per node.
Protocol Security	AES-128 (128-bit encryption), sequence numbers, other mechanisms

INTERNAL SENSOR DATA COLLECTION & STORAGE

Real-time reporting	Current Temperature of electronics printed circuit board (PCB). Current Input power, voltage and ripple
Stored module Information	XRN part number GTIN Serial number XRN hardware revision XRN firmware revision Bluetooth firmware revision

MECHANICAL DRAWINGS



REGULATORY & AGENCY APPROVALS

ELECTRICAL SAFETY & HANDLING

CE: IEC 60950-1:2005/AMD2:2013

IEC 60950-1:2005/AMD1:2009

IEC 60950-1:2005

IEC 62368-1:2014

UL: UL 60950-1, 2nd Ed. 2014-10-14

UL 62368-1, 2nd Ed, 2014-12-01

File E502142

Ingress Protection rating: IP20, Suitable for dry and damp locations

CSA: CAN/CSA C22.2 No. 60950-1-07 + A1:2011

CAN/CSA C22.2 No. 62368-1-14, 2nd Ed

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

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 and Mercury content: None

UV or IRC Emissions: None

WIRELESS COMPLIANCE

UNITED STATES

FCC NOTICE: This device complies with Part 15 of the FCC Rules. The device meets the requirements for the modular transmitter approval as detailed in FCC public Notice DA00-1407. Transmitter Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) This device must accept any interference received, including interference that may cause undesired operation.

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help

LABELING REQUIREMENTS: The Original Equipment Manufacturer (OEM) must ensure that FCC labelling requirements are met. This includes a clearly visible label on the outside of the OEM enclosure specifying the appropriate FCC identifier for this product as well as the FCC Notice above. The FCC identifier is FCC ID: 2AA9B10. In any case the end product must be labeled on the exterior with "FCC ID: 2AA9B10"

CANADA

ISED NOTICE: The device complies with Canada RSS-GEN Rules. The device meets the requirements for modular transmitter approval as detailed in RSS-GEN. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) This device must accept any interference received, including interference that may cause undesired operation.

L'appareil est conforme aux Règles RSS-GEN de Canada. L'appareil répond aux exigences d'approbation de l'émetteur modulaire tel que décrit dans RSS-GEN. L'opération est soumise aux deux conditions suivantes: (1) Cet appareil ne doit pas causer d'interférences nuisibles, et (2) Cet appareil doit accepter toute interférence reçue, y compris les interférences pouvant entraîner un fonctionnement indésirable.

ISED INTERFERENCE STATEMENT FOR CANADA

This device complies with Innovation, Science and Economic Development (ISED) Canada licence-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Cet appareil est conforme à la norme sur l'innovation, la science et le développement économique (ISED) norme RSS exempte de licence. L'exploitation est autorisée aux deux conditions suivantes : (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

ISED RADIATION EXPOSURE STATEMENT FOR CANADA

This equipment complies with ISED radiation exposure limits set forth for an uncontrolled environment.

Cet équipement est conforme aux limites d'exposition aux radiations ISED prévues pour un environnement incontrôlé.

LABELING REQUIREMENTS:

The Original Equipment Manufacturer (OEM) must ensure that ISED labelling requirements are met. This includes a clearly visible label on the outside of the OEM enclosure specifying the appropriate IC identifier for this product as well as the ISED Notice above. The IC identifier is 12208A-10. In any case, the end product must be labeled in its exterior with "IC: 12208A-10".

EUROPE

Declaration of Conformity: Hereby, Xicato declares that the XIM series products comply with the essential requirements and other relevant provisions of RED 2014/53/EU.