XICATO® GalaXi™

DATA SHEET

XIS: Xicato Intelligent Sensors

Figure 1: XIS03-D5M1LTH-B

Figure 2: XIS02 body, top and bottom

Figure 3: XIS-WT1-D5M1LTH-B

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 energy efficient, human-centric environments with our GalaXi™ portfolio of intelligent light sources, 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.

XICATO® GalaXi™

GENERAL DESCRIPTION

XIS – XICATO INTELLIGENT SENSOR

Part of the Xicato GalaXi™ portfolio of Bluetooth wireless devices, Xicato Intelligent Sensors (XIS) are programmable to transmit sensor data – including occupancy, ambient light (lux) level, temperature, humidity, and vibration – on a periodic basis to affect lighting control, environmental management, and other applications.

Xicato GalaXi currently includes Xicato intelligent LED modules (XIM), IP gateways (XIG), drivers (XID), protocol translators, switches, and software.

Different XIS models are designed for different purposes. XIS01 are integrated sensors on a single board, whereas XIS02 are expandable through wired, external modules. Each is capable of various combinations of passive infrared (PIR) motion, lux, temperature, humidity and accelerometer sensing. XIS01 is DC powered at 6-56 volts, so can be powered by anything from a standard 9V battery, to a standard AC-DC "wall wart" power transformer, to a lighting track operating at 12V, 24V or 48V. XIS02 "spider" sensors are 3V CR2450 coin cell battery powered and designed to be wall or ceiling mounted, or hidden behind artwork, with up to three peripheral sensors designed to provide motion and lux sensing data.

XIS advertise (broadcasts) sensor information as BLE data in a Xicato-defined, open format, which can be detected by compliant lighting modules, gateways (XIG), drivers (XID), smartphones or tablets, or other BLE-enabled devices. It can therefore simultaneously affect the control of any number of lights, while providing environmental data input to HVAC and other building management systems.

XIS are available as printed circuit board assemblies (PCBA) that can be used as-is or adapted by third parties into enclosures suitable for different applications.

All Xicato GalaXi products will migrate to the new Bluetooth Mesh standard in the first half of 2018, expanding the GalaXi ecosystem by opening new opportunities for interoperability with 3rd party products and software.

FEATURES

XICATO INTELLIGENT SENSOR PROCESSOR

The conversion of sensor input to BLE messages on the XIS is handled by the Xicato Intelligent Sensor Processor (XISP). The XISP can support up to 3 "toggle" sensor inputs for motion sensors and two I2C busses for other standard sensors.

The toggle inputs are LVTTL/LVCMOS inputs that indicate motion/occupancy of a space by toggling the pin from low to high when the sensor detects motion/occupancy. There are no requirements on the type of sensor that should be used to detect motion/occupancy, only that the sensor toggles its output in response to detecting motion/occupancy. The standard XIS PIR motion sensor has a range of 5 meters, but can supply other PIR motion sensor types as described below.

The I2C interface can support a wide variety of standard sensors with firmware support currently available for lux and humidity sensors (please contact Xicato for specific sensor model numbers supported). Support is planned for accelerometers – e.g., to detect movement of the XIS itself – in future firmware updates.

Unlike other so-called "intelligent" sensors, which are paired with specific lighting circuits and must be programmed, the Xicato sensors broadcast sensor data into the Bluetooth network for use by any number of lighting or other IoT nodes, or by the Xicato Intelligent Gateway for use of Building Management Systems in any way. This allows the sensor data to be used by any number of lights, by other devices in the space, such as ventilation systems, by the Xicato Intelligent Driver (XID), or other control devices, or by the Xicato IP Gateway (XIG), which can forward the data to a remote server for tracking of visitor occupancy, motion, light level, temperature and humidity for a variety of purposes. See the Xicato website for more information.

PASSIVE INFRARED MOTION SENSING

The standard PIR motion sensor included on the XIS (M1 or M4) has a range of 5 meters, and detects occupancy of people and animals walking through the space. XIS can also be ordered with a long-range sensor with a detection distance of 10-12 meters. The XIS01 integrates one PIR motion sensor on the PCBA. The XIS02 has a single, 2-wire connector for a remote PIR sensor.

LUX SENSING

The XIS supports an I2C based lux sensor with a reporting range of 1 lux to 65,535 lux and with a measurement integration time of less than 1 second. In addition, the lux sensor is designed to closely match the photopic response of the human eye, including significant infrared rejection. XIS01 includes a single on-board lux sensor. The XIS02 includes I2C connectors for two remote lux sensors (included).

LUX-HOUR COLLECTION

The XIS stores total lux-hours in a re-settable buffer for retrieval using the Xicato Control Panel or 3rd party software working through the Xicato Intelligent Gateway (XIG). This allows art conservators, for example, to track lux-hour exposure of paintings, fabrics, and other photosensitive objects, or for facility managers to understand the ambient light conditions of a room.

TEMPERATURE AND RELATIVE HUMIDITY SENSING

All XIS have dedicated temperature and relative humidity sensing. The values read from the sensor are reported by the XIS over Bluetooth Low Energy on a regular period that is configurable by the user.

MOVEMENT (ACCELEROMETER) (XIS02 ONLY)

XIS02 is pre-configured with an I2C based movement sensor (i.e., accelerometer), in anticipation of support in a future firmware release that can be updated over the air (OTA) over the Bluetooth network. Once implemented, this will allow for the detection of movement of the XIS as well as any impacts detected beyond a specified threshold. For example, the accelerometer could be used by museum security to detect the motion of artwork that should not be disturbed.

FLEXIBLE INPUT VOLTAGE...

XIS01, XIS03, and the housed models can be powered by anything from a 9V battery to a standard 48V wall wart transformer. It is particularly well suited for installation on 12V, 24V or 48V track.

... OR STANDALONE BATTERY POWER (XIS02)

XIS02 is 3V powered using a standard CR2450 coin cell battery, providing the flexibility to mount it anywhere – behind a painting. Under a retail shelf. Next to a door or window. XIS02 alone can simply detect temperature and humidity, or can be wired to remote motion or lux sensor elements (included) for flexible occupancy and light level sensing. Depending on how you configure the advertising power and cadence, the battery can provide years of reliable operation, and because it reports its battery level to the Xicato Control Panel or Xicato Intelligent Gateway (XIG) you will know well in advance when it is time to replace it.

CONFIGURABLE ADVERTISING POWER AND INTERVAL

Depending on your application, XIS can be configured with different transmit power settings and intervals to increase data granularity, or to conserve battery power. All configuration of the XIS can be performed through Xicato's Control Panel software, or using compatible software from third party vendors.

ORDERING GUIDE

GUIDE TO PART NUMBERING

Product	Form	-	Input Voltage	Sensor	-	Comms
XIS = sensor **XSA = accessory**	"" = sensor only 00 = custom 01 = (discontinued) 02 = spider 03 = integrated PCBA WT1 = white housing BK1 = black housing		B1 = 3V battery D5 = 12-48V	M1 = Std Motion M2 = Fine Motion M3 = Long Motion M4 = Hybrid Motion L = Lux T = Temperature H = Relative Humidity A = Accelerometer C = eCO2 (VOC) X = 3w toggle conn Y = 4w I2C conn		B = BLE

AVAILABLE PARTS

Part Number	Description
XIS02-B1M4LLTHA-B	PCBA, spider sensor, 3.3V, temp, humidity, accel, remote sensors 1x PIR, 2x lux
XIS03-D5M1LTH-B	PCBA, integrated sensor, 12-56V, PIR standard, lux, temp, humidity
XIS03-D5M3LTH-B	PCBA, integrated sensor, 12-56V, PIR long reach, lux, temp, humidity
XIS-BK1-D5M1LTH-B	Xicato Intelligent Sensor, Black, 12-56V, PIR standard, lux, temp, humidity
XIS-BK1-D5M3LTH-B	Xicato Intelligent Sensor, Black, 12-56V, PIR long reach, lux, temp, humidity
XIS-WT1-D5M1LTH-B	Xicato Intelligent Sensor, White, 12-56V, PIR standard, lux, temp, humidity
XIS-WT1-D5M3LTH-B	Xicato Intelligent Sensor, White, 12-56V, PIR long reach, lux, temp, humidity

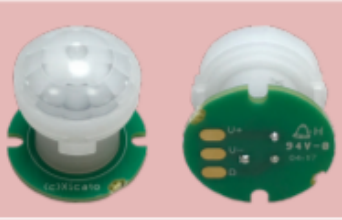
XICATO® GalaXi™

MECHANICAL, ELECTRICAL AND WIRELESS SPECIFICATIONS

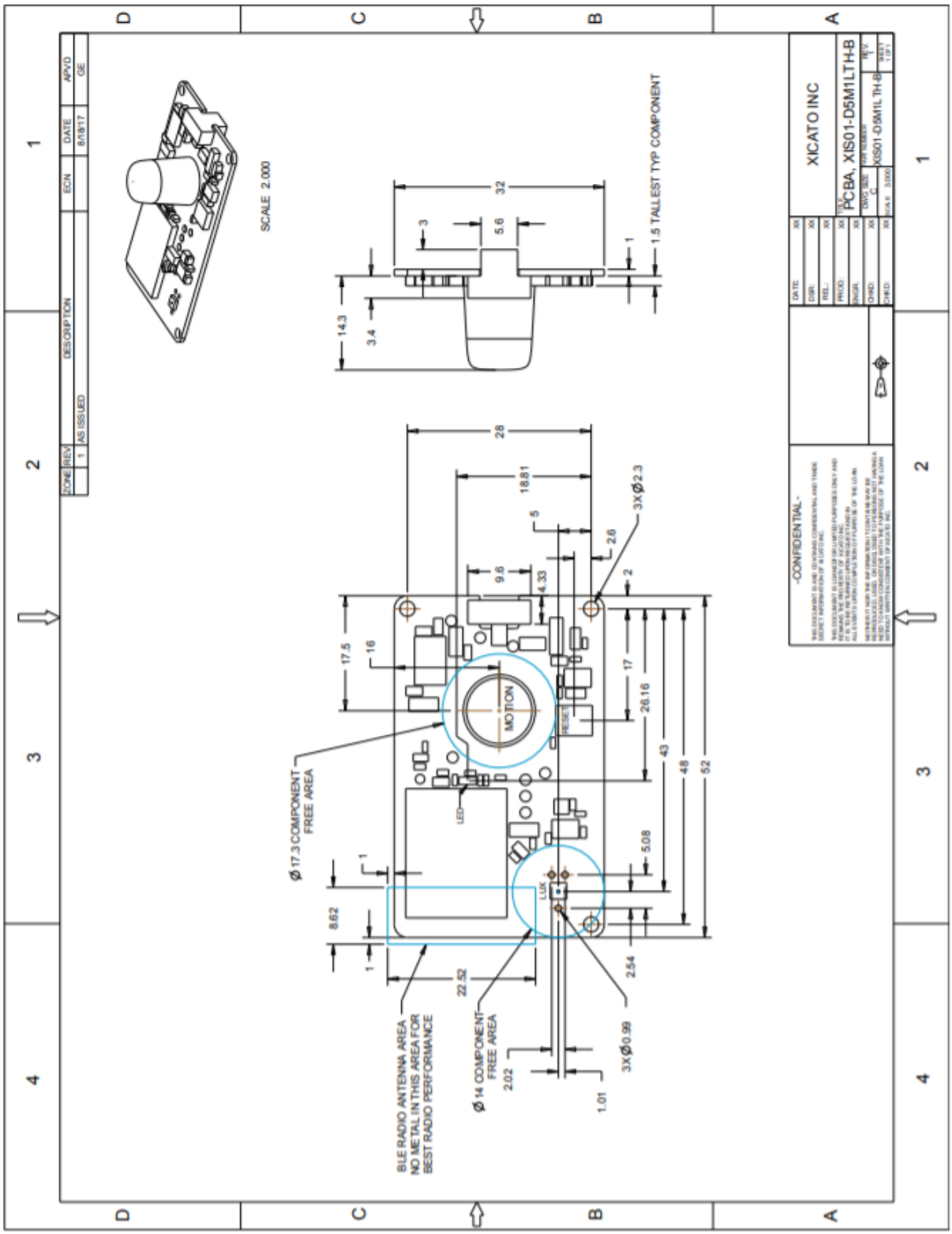
	XIS02-BUNDLE1	XIS03-D5MxTH-B	
			
Form factor	PCBA (3)	PCBA	Field Installable
Dimensions	43 x 40 x 8.9 mm (Ø46 mm max)	44 x 30 x 19.4 mm (1.7 x 1.2 x 0.76 in)	51 x 36.4 x 26.7 mm (2.0 x 1.4 x 1.1 in)
Weight	8 grams (without coin battery)	6 grams	22 grams
Operating temp	-25˚C to +85˚C		
Storage temp	-40˚C to +85˚C		
Input Voltage	3V coin cell battery CR2450	12V to 56V DC	
Power Connection	Not Applicable	Molex 1041880210	
Wire Harness Part #	Not Applicable	NA: 2-wire push-in 18-24 AWG solid 20-22 AWG stranded	
Power Consumption[1]	< 1mW @ 3V	< 20mW @ 48V	
PIR motion sensors	1 remote	1 (standard or long reach)	
Lux sensors	2 remote	1	1
Temperature sensors	1	1	1
RH sensors	1	1	1
Accelerometer	1	0	0
Wireless Spectrum	2.4 GHz ISM band		
Bandwidth	1 Mbps	1 Mbps or 2 Mbps	
Channels	40		
Processor	ARM Cortex M0, 32-bit, 48 MHz	ARM Cortex M4F, 32-bit, 64 MHz	
Wireless Protocol	Bluetooth Low Energy v4.1	Bluetooth 5.0	
Transmit Power	-18 dBm to +3 dBm	-20 dBm to +4 dBm	
Receive Sensitivity	-87 dBm	-96 dBm @ 1 Mbps -93 dBm @ 2 Mbps	
RSSI Resolution	1 dBm		

PERIPHERAL SENSORS TO XIS02

XIS02 has ports for connecting up to three remote sensors (included in XIS02-BUNDLE1). Remote sensors are delivered as shown, with no wires.

	XIS-M4	XIS-L
Remote sensors (top and bottom views)		
Form Factor	PCBA	PCBA
Dimensions	Ø18 mm x 18.4 mm	10 mm x 5 mm
Weight	2g	1g
Physical Interface	3 wire, customer soldered	4-wire, customer soldered
Electrical Interface	V+, V-, data	I2C
Incremental power consumption		
Maximum Wire Length (distance from body)		
Detection Range	5m (standard) 2m (slight motion option)	NA
Reporting Range	Binary (high/low)	1 lux to 65,535 lux
Response / Integration Time		< 1 sec integration time

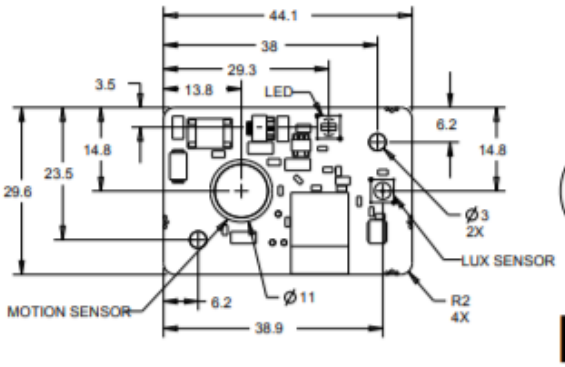
XIS01 MECHANICAL DRAWING

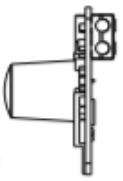


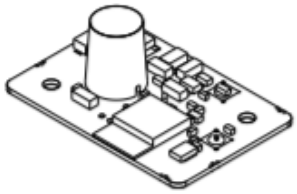
XIS03 MECHANICAL DRAWINGS

XIS-03-M1

REVISIONS					
ZONE	REV	DESCRIPTION	DATE	ECN	APVD
	1	PRELIMINARY	8/21/18		







PRELIMINARY

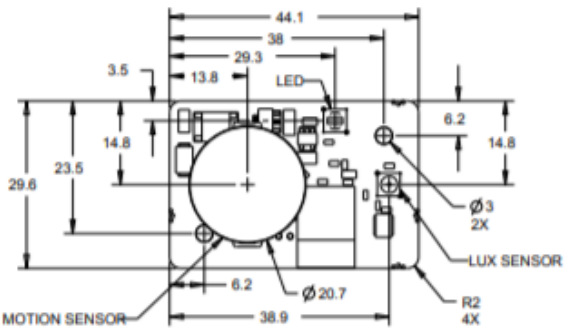
NOTES:

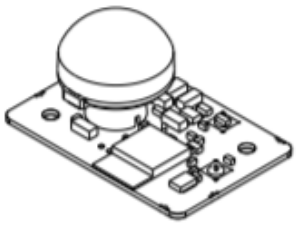
1. CONSULT 3-D CAD MODEL FOR COMPONENT HEIGHTS AND LOCATIONS

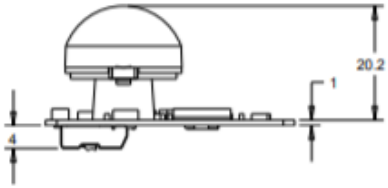
-CONFIDENTIAL-				
			XICATO INC	
			PCBA, XIS-03	
		SIZE B	XIS-03	REV 1
		SCALE: 2:1		SHEET 1 OF 3

XIS-03-M3

REVISIONS					
ZONE	REV	DESCRIPTION	DATE	ECN	APVD
		SEE SHEET 1			







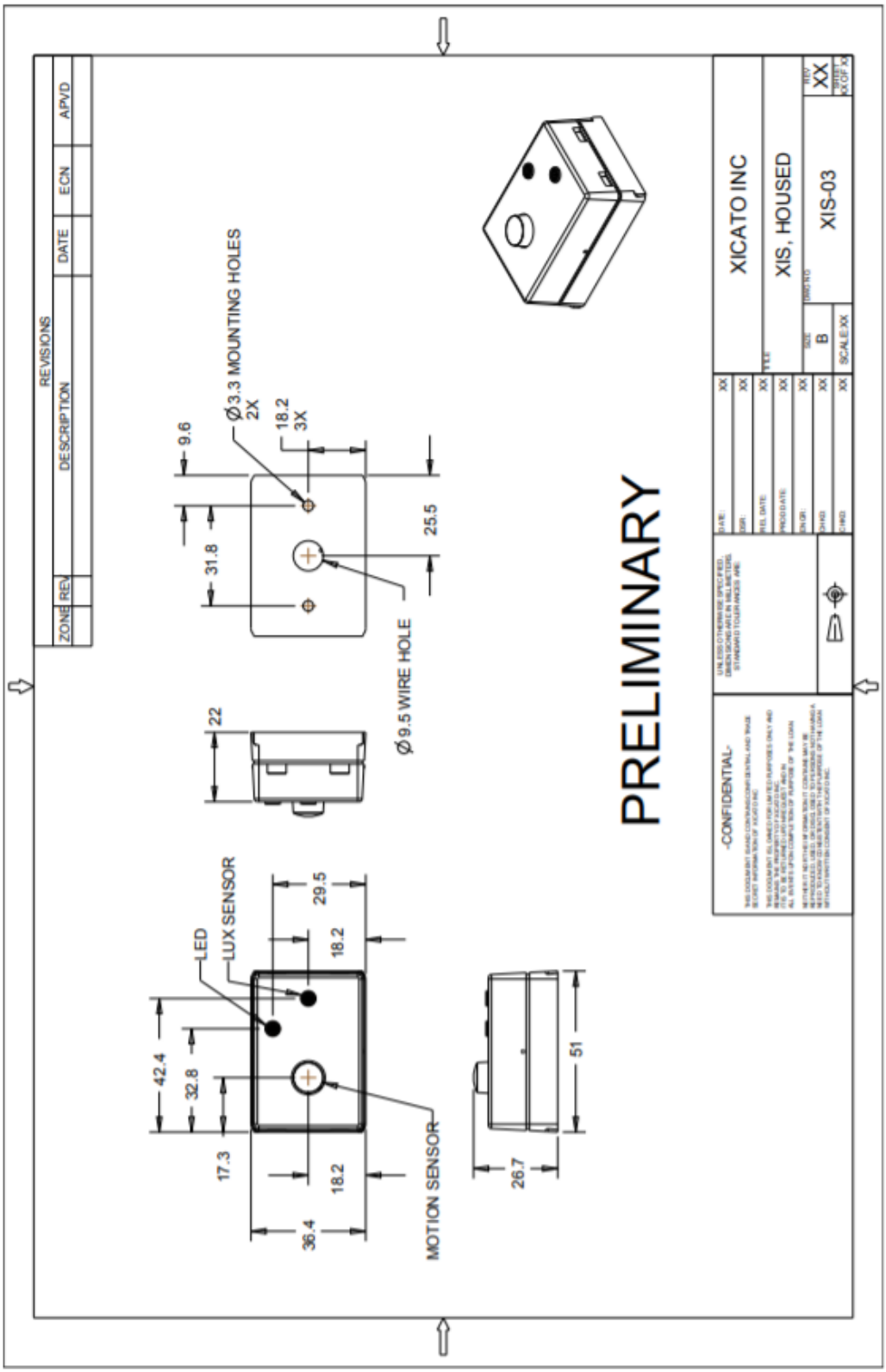
PRELIMINARY

NOTES:

1. CONSULT 3-D CAD MODEL FOR COMPONENT HEIGHTS AND LOCATIONS

-CONFIDENTIAL-				
			XICATO INC	
			PCBA, XIS-03	
		SIZE B	XIS-03	REV 1
		SCALE: 2:1		SHEET 2 OF 3

XIS-WT1/BK1 MECHANICAL DRAWINGS



MOTION DETECTION PATTERNS & PERFORMANCE

NOTE: The integrated standard and long reach motion sensors have slightly asymmetrical detection patterns on perpendicular axes, as shown. On the XIS01 and XIS03, the longer TOP VIEW pattern is oriented along the shorter width of the PCBA, while the SIDE VIEW is oriented along the length.

The standalone, remote XIS-M4 sensor is a hybrid sensor, with fine motion in the central area and standard motion in the surrounding area.

MOTION DETECTION PERFORMANCE, M1 – M3

	M1 Standard Motion	M3 Long Motion
Detection Distance	5m (16.40 ft)	10m (32.8 ft)
Detection angles (HxV)	100° x 82°	110° x 93°
Detection Zones	64	80
Temp difference between target and background	> 4°C	
Target movement speed	0.8 – 1.2 m/s	0.8 – 1.2 m/s
Target size	700 x 250mm (human body)	700 x 250mm (human body)

MOTION DETECTION PATTERNS, M1-M3

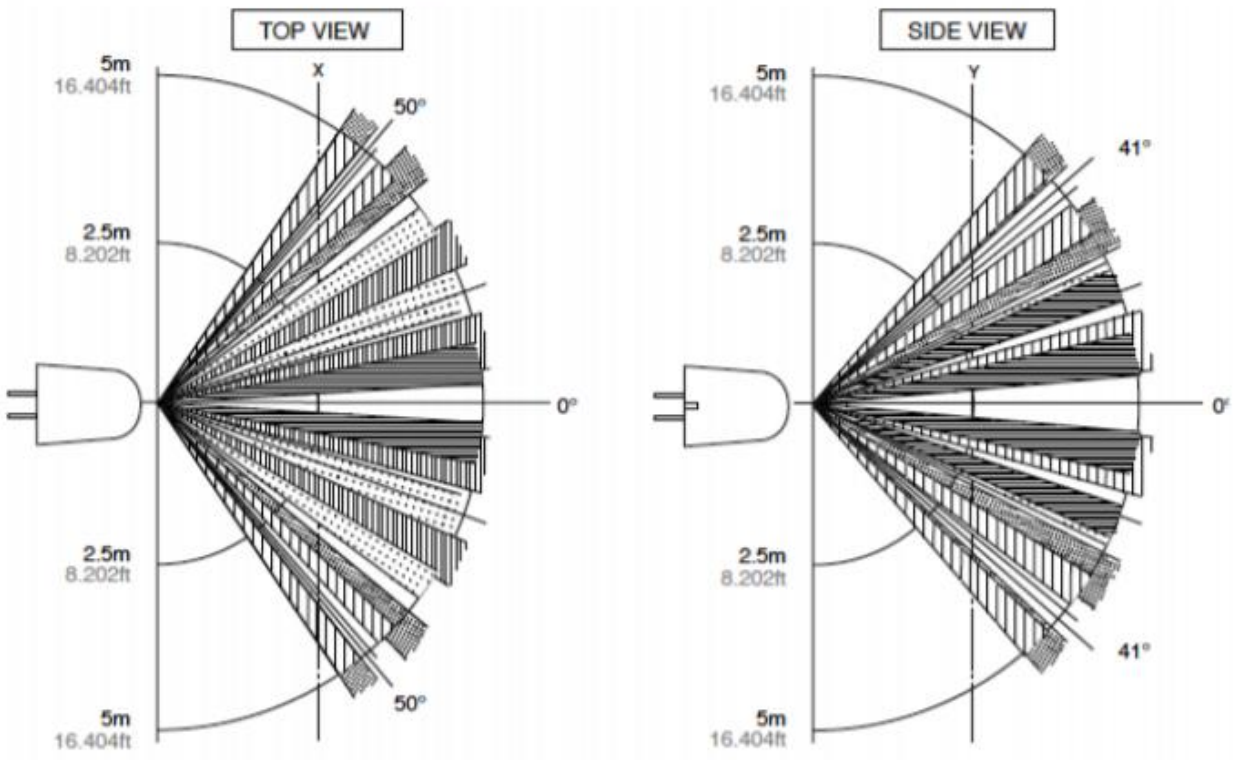


Figure 4: (above) M1 Standard Motion detection pattern

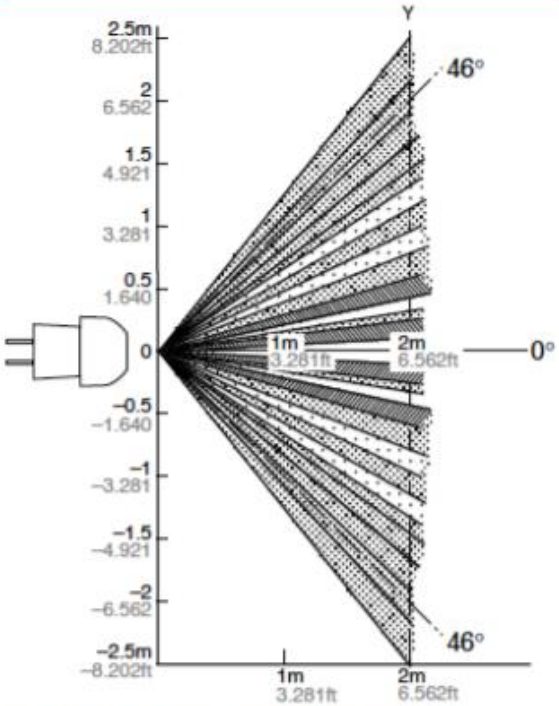


Figure 5: (above) M2 slight motion detection pattern

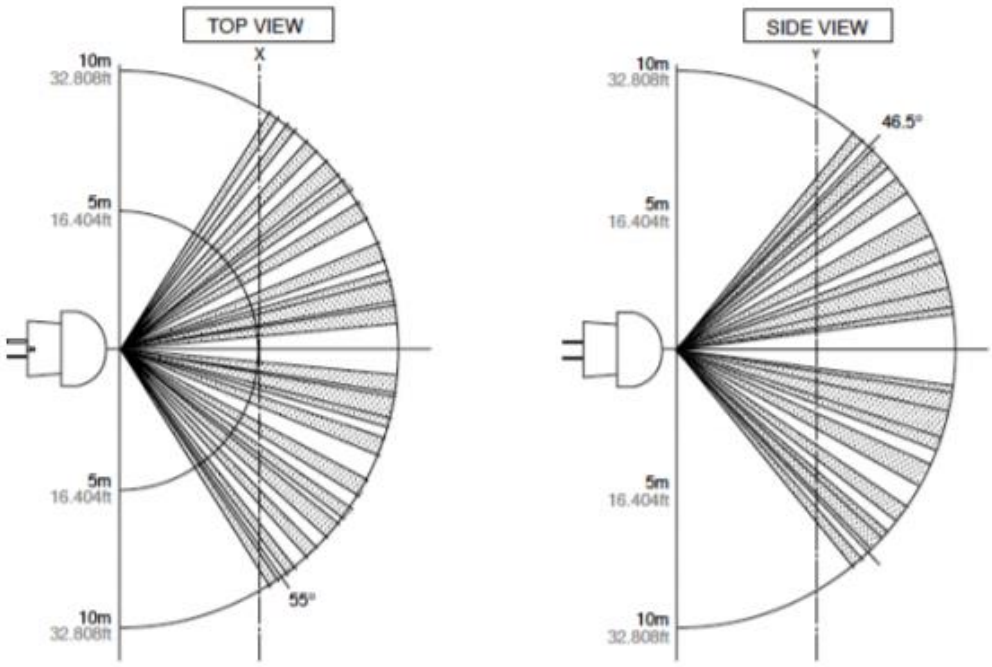


Figure 6: (above) M3 long reach motion detection pattern

M4 HYBRID MOTION DETECTION

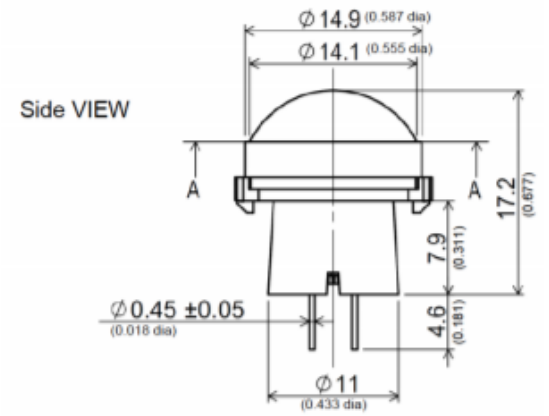


Figure 7: M4 hybrid motion mechanical dimensions

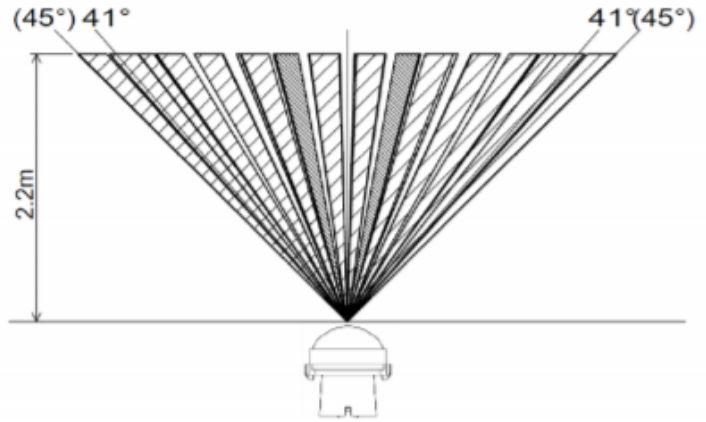


Figure 8: M4 hybrid motion detection pattern

M4 DETECTION PERFORMANCE

		Temperature Difference	Value	Target Conditions
Detection Range	Slight motion detection area	8°C (14.4°F)	Max 3m	Movement speed: 0.5m/s Target is human head (~200x200mm) Passing 1 zone
		4°C (7.2°F)	Max 2.2m	
	Standard motion detection area	8°C (14.4°F)	Max 3m	Movement speed: 1.0m/s Target is human body (~400x200mm) Passing 2 zones
		4°C (7.2°F)	Max 2.2m	

			Value
Detection Area	Slight motion detection area	Horizontal	44° (± 22°)
		Vertical	44° (± 22°)
		Detection Zones	36
	Standard motion detection area	Horizontal	90° (± 45°)
		Vertical	90° (± 45°)
		Detection Zones	48