ZMOTION™ Lens and Pyroelectric Sensor

Product Specification

PS028609-0213

www.zilog.com

Warning: DO NOT USE THIS PRODUCT IN LIFE SUPPORT SYSTEMS.

LIFE SUPPORT POLICY

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As used herein

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Revision History

Each instance in the revision history table reflects a change to this document from its previous revision. For more details, refer to the corresponding pages or appropriate links provided in the table below.

Date	Revision Level	Description	Page Number
Feb 2013	09	Moved NCL-11 lens specification to Table 2; added the CM 0.77 GI V2 lens specification; alphanumerically reordered all lenses.	2, 8
May 2012	08	Added the NCL-11 and EWA 0.3 GI V2 lens specifications.	36, 18
Nov 2011	07	Added the NCL-3R and NCL-10S lens specifications.	22, 34
Mar 2011	06	Intrusion lens specifications added.	38
Jan 2011	05	Modifications to some lens/sensor descriptions in Table 2.	2
Jan 2011	04	Updated to include two new Nicera sensors.	19, 29
Nov 2010	03	Updated to new Zilog/IXYS logo and accepted Zilog style; replaced all instances of *ePIR* with *advanced passive infrared*.	All
Sep 2010	02	Replaced Zilog logos, ePIR with ZMOTION, and Zdots with Module; fixed formatting and pagination issues; removed references to GP and General Purpose.	All
Oct 2010	01	Original issue	All

Table of Contents

Overview

Zilog's ZMOTION Detection and Control and Intrusion Detection product families provide integrated and flexible solutions for Passive Infrared (PIR)-based motion detection applications. These product families are based on the ZMOTION MCU, a high-performance microcontroller featuring integrated PIR motion detection algorithms. Each family includes a selection of lenses and PIR sensors to fit a wide range of application requirements. Each lens and sensor combination is optimized for its intended application by configuration settings loaded into the ZMOTION MCU ensuring the best possible performance while significantly reducing development risk and minimizing time to market. Zilog's PIR Motion Detection Technology provides a dramatic improvement in both sensitivity and stability over traditional designs and is scalable to many market segments including Security/Intrusion Detection, Lighting Control, HVAC, Access Control, Vending, Display, Proximity, Power Management, Occupancy Sensing and many others.

This document provides the zone patterns and mechanical dimensions for the Zilog-supported lenses and pyroelectric sensors included in the ZMOTION Family. Each supported lens and pyroelectric sensor combination is provided with an associated configuration file for the ZMOTION MCU. It is possible to use other lenses and pyroelectric sensors not directly supported by Zilog by developing the appropriate configuration settings based on one of the existing files.

There are two general groups of lenses provided:

- ZMOTION Detection and Control for general motion detection applications
- ZMOTION Intrusion Detection for security applications

All lenses and pyroelectric sensors listed in this document are available from Zilog as a bundle (which includes MCU, lens and pyroelectric sensor) or individually from their associated manufacturers. Because Zilog is regularly adding new lens support to these ZMOTION product families, please obtain the latest version of this document from our website at: www.zilog.com/ZMOTION.

PIR Sensor Specifications

The pyroelectric sensors included in the ZMOTION product families are manufactured by Nippon Ceramic Company Ltd. (Nicera). Please refer to their website for any specific information you may require.

Table 1 shows the pyroelectric sensors available for both the ZMOTION Detection and Control and Intrusion Detection Families.

Table 1. ZMOTION Pyroelectric Sensors

Manufacturer	Part Number	Description
Nicera	RE200B-P	Basic Dual Element
Nicera	SDA02-54-P	Premium Dual Element
Nicera	SBDI46-504AA	Quad Element

ZMOTION Lens Selection Guide

Select a lens and pyroelectric sensor based on the intended application from Table 2. Lenses and pyroelectric sensors for security/intrusion-related applications are listed in Table 3.

Table 2. ZMOTION Detection and Control Lenses and Pyroelectric Sensors

Part Number	Description	Recommended Applications	Configuration Header File	Pyroelectric Sensor
AA 0.9 GI T1 Lens Specification – see page 7	Animal Alley Array (88°) 35.6mm x 49.9mm Flat Fresnel lens 22.9mm focal length 25 meter range 22 equal segments	Corner wall mount or very high ceiling with rectangular floor pattern Warehouse Lighting (Bay Light) Combined Intrusion and Lighting Control HVAC	API_INIT_01.h	RE200B-P SDA02-54-P

Note: *The NCL-11 and EWA 0.3 GI V2 lenses are not currently part of the standard ZMOTION bundled suite or offered in ZMOTION development kits. However, the optimized API settings for this lens are available in the ZMOTION Detection Lens and Pyro Sensor Configuration Guide (WP0018).

Table 2. ZMOTION Detection and Control Lenses and Pyroelectric Sensors (Continued)

Part Number	Description	Recommended Applications	Configuration Header File	Pyroelectric Sensor
CM 0.77 GI V2 Lens Specification – see page 8	Ceiling Mount Array (360°) 37mm diameter circular lens 19.6mm focal length 12.2m radius at 3.7m height 4:1 floor coverage diameter-to-height ratio	High ceiling mount for commercial lighting control Commercial HVAC	API_INIT_02.h	SBDI46-504AA RE200B-P
CM 0.77 GI V3 Lens Specification – see page 10	Ceiling Mount Array (360°) 37mm diameter circular lens 19.6mm focal length 3.7m radius at 2.4m height 3:1 floor coverage diameter to height ratio	Ceiling Mount for standard commercial heights Lighting Control HVAC Control Meeting rooms	API_INIT_02.h	RE200B-P SBDI46-504AA
CM 0.77 GI V5 Lens Specification – see page 12	Ceiling Mount Array (360°) 37mm diameter circular lens 19.6mm focal length 12.2m radius at 12.2m height 2:1 floor coverage diameter to height ratio	High ceiling mount for commercial and industrial applications Commercial Lighting Control Commercial HVAC Control	API_INIT_03.h	RE200B-P SBDI46-504AA
CWM 0.5 GI V1 Lens Specification – see page 15	Ceiling/Wall Mount Array (180°) Circular lens with 24mm x 24mm square base 14.2mm focal length Board mount clip-in	Wall or ceiling mount for office or meeting room lighting and HVAC control Room Lighting and HVAC Control	API_INIT_04.h	RE200B-P SBDI46-504AA

Note: *The NCL-11 and EWA 0.3 GI V2 lenses are not currently part of the standard ZMOTION bundled suite or offered in ZMOTION development kits. However, the optimized API settings for this lens are available in the ZMOTION Detection Lens and Pyro Sensor Configuration Guide (WP0018).

Table 2. ZMOTION Detection and Control Lenses and Pyroelectric Sensors (Continued)

Part Number	Description	Recommended Applications	Configuration Header File	Pyroelectric Sensor
EWA 0.3 GI V2 Lens Specification – see page 18	Extra Wide Angle Wall Mount Array (180°) 14mm x 28mm 7.6mm focal length 5 meter range 16 equal segments	Room occupancy and proximity sensing 180° detection with single pyro Wall mount room lighting control AC light switch replacement Hotel room thermostats	N/A*	RE200B-P
NCL-3B Lens Specification – see page 19	10mm wall mount array (60° x 60°) Clips on to pyroelectric sensor 4 beams (X); 2 beams (Y) 10m range	Proximity or Entrance Detection Kiosk Vending HVAC Display counters	API_INIT_06.h	RE200B-P
NCL-3R Lens Specification – see page 22	10mm Wall/Ceiling Mount Array (80° x 30°) Clips on to pyroelectric sensor 6 beams (X); 2 beams (Y) 10m range	Proximity or Entrance Detection Kiosk Vending HVAC Display counters	API_INIT_07.h	RE200B-P
NCL-9(26) Lens Specification – see page 26	Clip-on 15mm Array (360°) Clips on to pyroelectric sensor 2.25m radius at 2m height 2.1:1 Floor coverage diameter to height ratio	Room Occupancy and Proximity Sensing Lighting Control HVAC Control Appliance Kiosk/Display Control Vending Power Management Appliance Power Management	API_INIT_05.h	RE200B-P SBDI46-504AA

Note: *The NCL-11 and EWA 0.3 GI V2 lenses are not currently part of the standard ZMOTION bundled suite or offered in ZMOTION development kits. However, the optimized API settings for this lens are available in the ZMOTION Detection Lens and Pyro Sensor Configuration Guide (WP0018).

Table 2. ZMOTION Detection and Control Lenses and Pyroelectric Sensors (Continued)

Part Number	Description	Recommended Applications	Configuration Header File	Pyroelectric Sensor
NCL-10IL Lens Specification – see page 29	10mm Wall/Ceiling Mount Array (80° x 30°) Clips on to pyroelectric sensor 6 beams (X); 2 beams (Y) 10m range	Proximity or Entrance Detection Kiosk Vending HVAC Display counters	API_INIT_07.h	RE200B-P
NCL-10S Lens Specification – see page 34	10mm wall mount (27°) directional Clips on to pyroelectric sensor 2 beams (X), 1 beam (Y) 10m range	Entrance detection Kiosk Vending HVAC Display counters	API_INIT_09.h	RE200B-P
NCL-11 Lens Specification – see page 36	Wall mount array 104° (X), 37° (Y) 32 detection zones Circuit board mount, black rectangular lens 4 meter range	Room occupancy and proximity sensing Consumer electronics and appliance power management Display power management TV auto shut-off Keypad motion detector	API_INIT_0A*	RE200B-P

Note: *The NCL-11 and EWA 0.3 GI V2 lenses are not currently part of the standard ZMOTION bundled suite or offered in ZMOTION development kits. However, the optimized API settings for this lens are available in the ZMOTION Detection Lens and Pyro Sensor Configuration Guide (WP0018).

Table 3. ZMOTION Intrusion Detection Lenses and Pyroelectric Sensors

Part Number	Description	Typical Applications	Configuration Header File	Pyroelectric Sensor
LR 1.2 GI 12 V3 Lens Specification – see page 39	Long Range Array 42.6mm x 61.0mm Flat Fresnel 30.5mm (1.2") focal length 30.5 meter (100') range 3:1 floor coverage diameter to height ratio	Wall mount long range corridor/hallway security/ intrusion motion detector	API_INIT_10.h	RE200B-P
VB 1.2 GI V1 Lens Specification – see page 40	Vertical Barrier Array 42.6mm x 61.0mm Flat Fresnel 30.5mm (1.2") focal length 15 meter range, horizontal 7 meter range, vertical	Wall or ceiling mount curtain or vertical barrier security/intrusion motion detector	API_INIT_11.h	RE200B-P
WA 1.2 GI 12 V4 Lens Specification – see page 41	Wide Angle Array (88°) 42.6mm x 61.0mm Flat Fresnel 30.5mm (1.2") focal length 18 meter range	Corner/Wall Mount security/intrusion motion detector Pet immune detector Wide area security motion detector	API_INIT_09.h	RE200B-P

Note: *The NCL-11 and EWA 0.3 GI V2 lenses are not currently part of the standard ZMOTION bundled suite or offered in ZMOTION development kits. However, the optimized API settings for this lens are available in the ZMOTION Detection Lens and Pyro Sensor Configuration Guide (WP0018).

ZMOTION Detection and Control Lens Specifications

Figures 1 through 27 on the following pages discuss the specifications of the lenses selected for the ZMOTION Detection and Control family of products. To see specifications for lenses used in security and intrusion detection applications, refer to the ZMOTION Intrusion Detection Lens Specifications section on page 38.

AA 0.9 GI T1 Lens Specification

The AA 0.9 GI T1 lens array is optimized for dual element pyroelectric sensors in long range sensing applications. It is normally used with the grooved side facing the pyroelectric detector, and curved at a 0.9 inch (22.9mm) radius about the sensitive area of the detector. The detector position should be 0.492" (12.5mm) below the upper edge, and centered left-right.

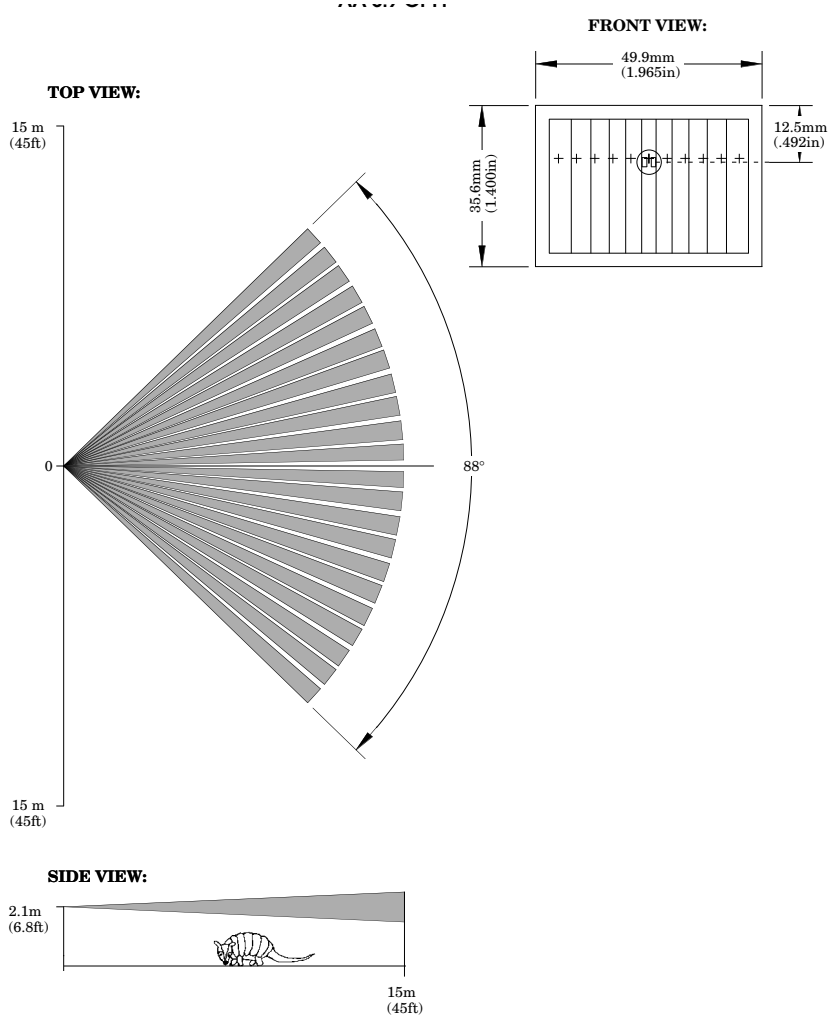


Figure 1. The AA 0.9 GI T1 Lens Specification

CM 0.77 GI V2 Lens Specification

The CM 0.77 GI V2 lens is intended for high ceiling-mounted commercial lighting and HVAC applications in which high floor coverage is required. See Figures 2 and 3.

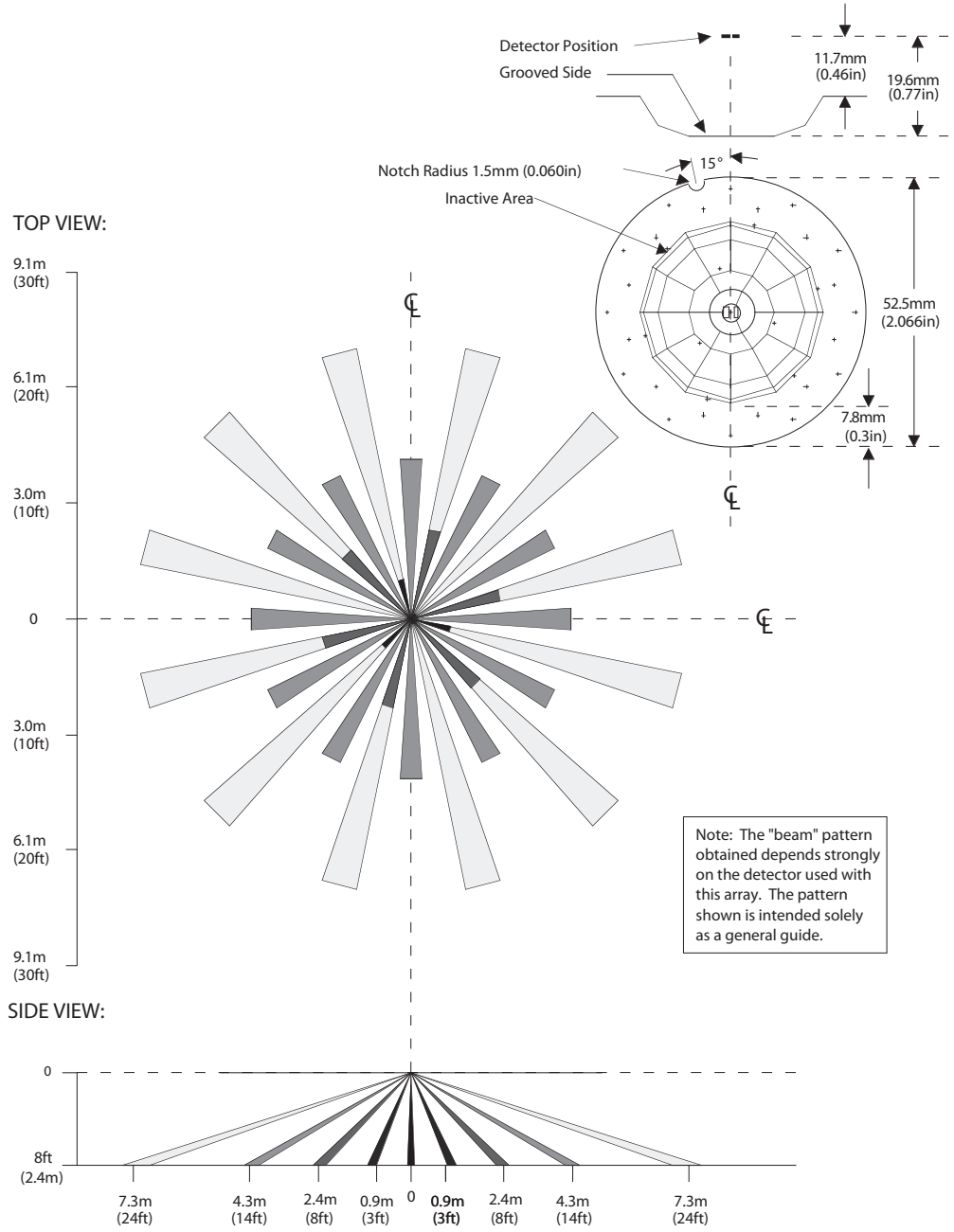


Figure 2. CM 0.77 GI V2 Lens Specification: Front View

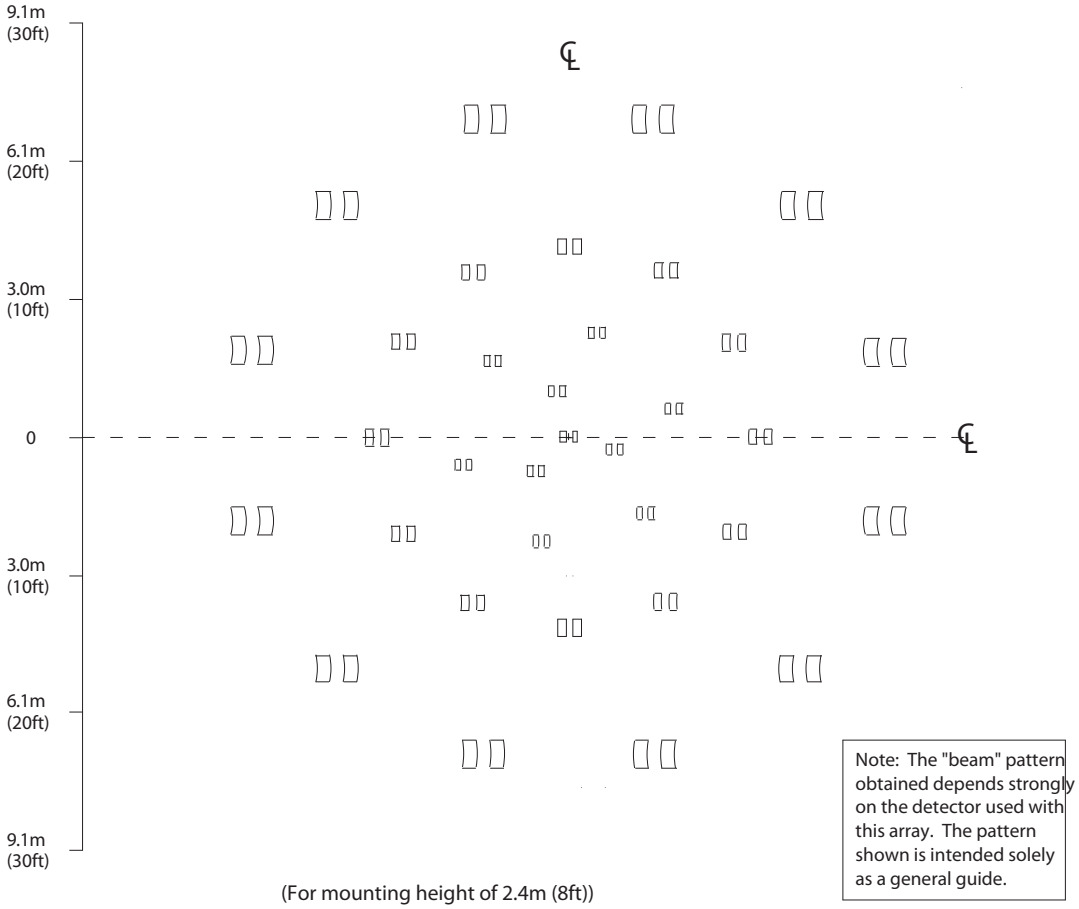


Figure 3. CM 0.77 GI V2 Lens Specification: Floor Coverage, Side View

CM 0.77 GI V3 Lens Specification

The CM 0.77 GI V3 lens array is intended for ceiling-mounted applications and is optimized for use with both dual and quad element pyroelectric sensors. The detector mounting flange should be 0.46" (11.7 mm) from the pyroelectric sensor's element. The angle from the center line to the placement notch is 15 degrees.

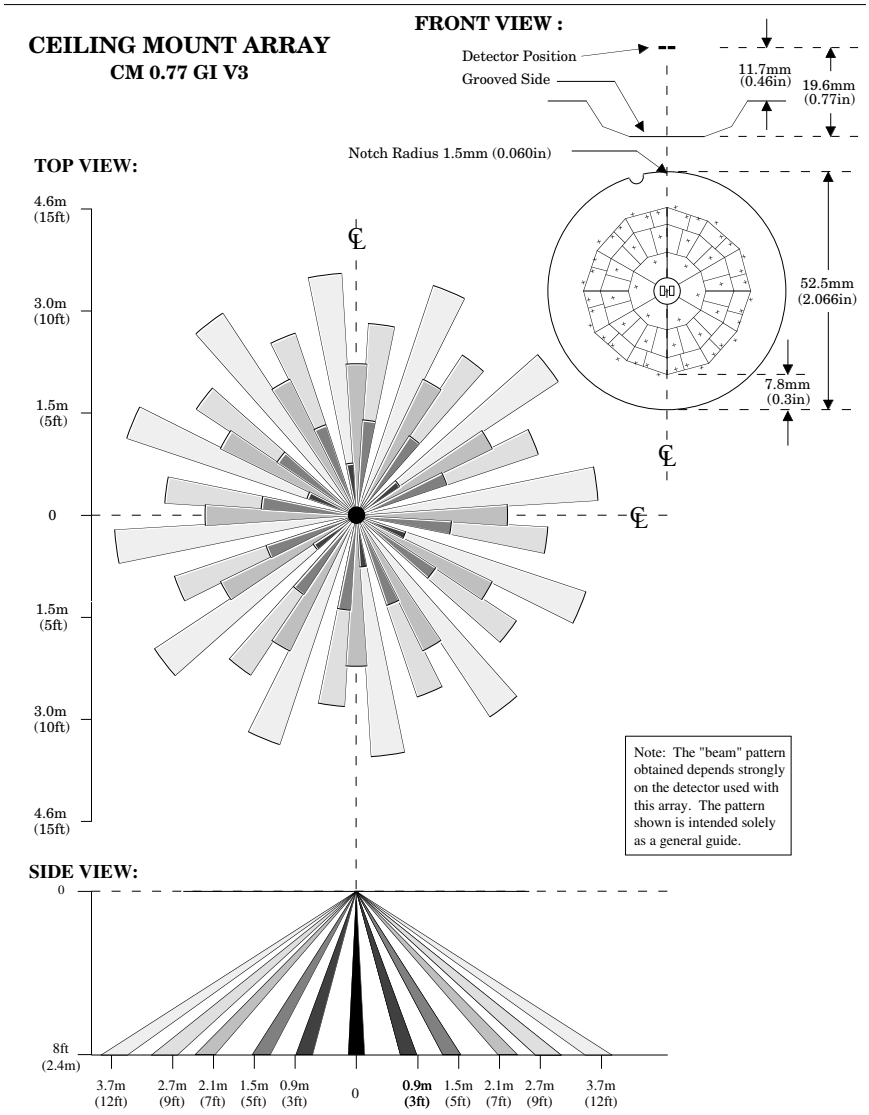


Figure 4. The CM 0.77 GI V3 Lens Specification, #1 of 2

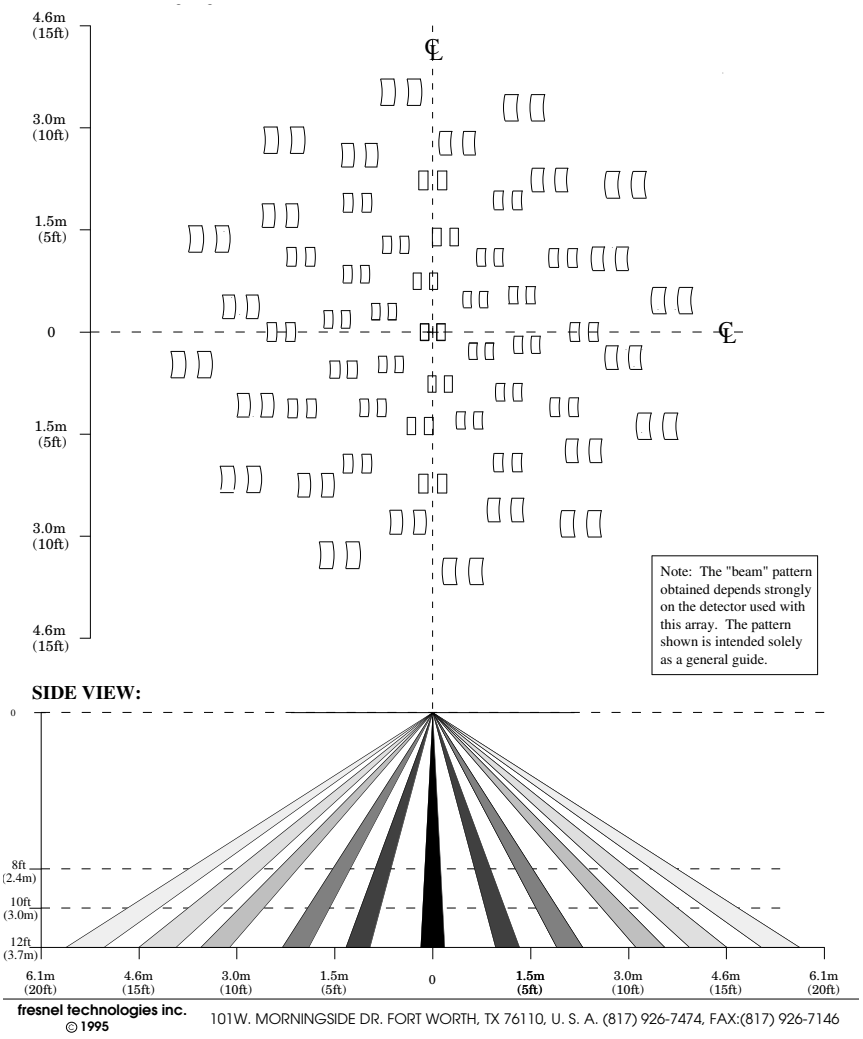


Figure 5. The CM 0.77 GI V3 Lens Specification, #2 of 2

CM 0.77 GI V5 Lens Specification

The CM 0.77 GI V5 lens array is intended for ceiling-mounted applications and is optimized for both dual and quad element pyroelectric detectors. The detector mounting flange should be 0.46" (11.7 mm) from the pyroelectric sensor's element.

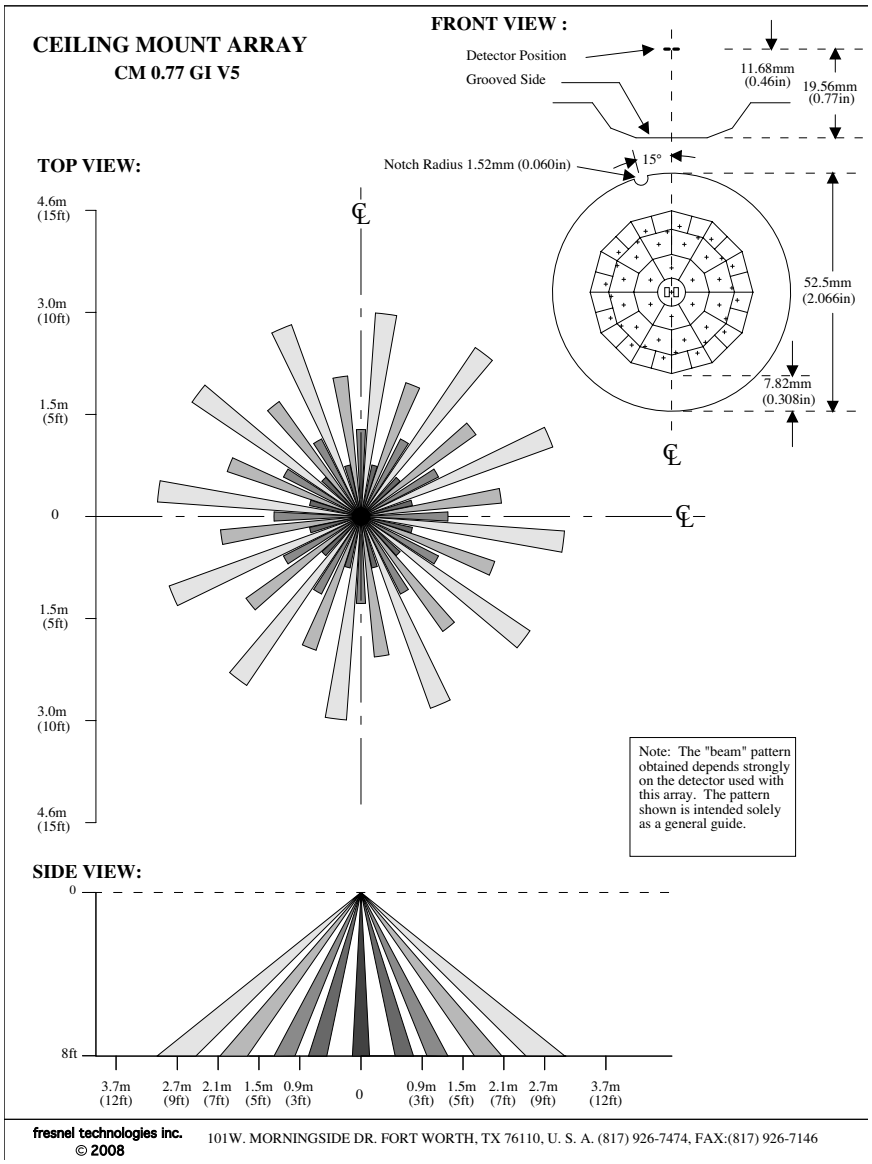


Figure 6. The CM 0.77 GI V3 Lens Specification, #1 of 3

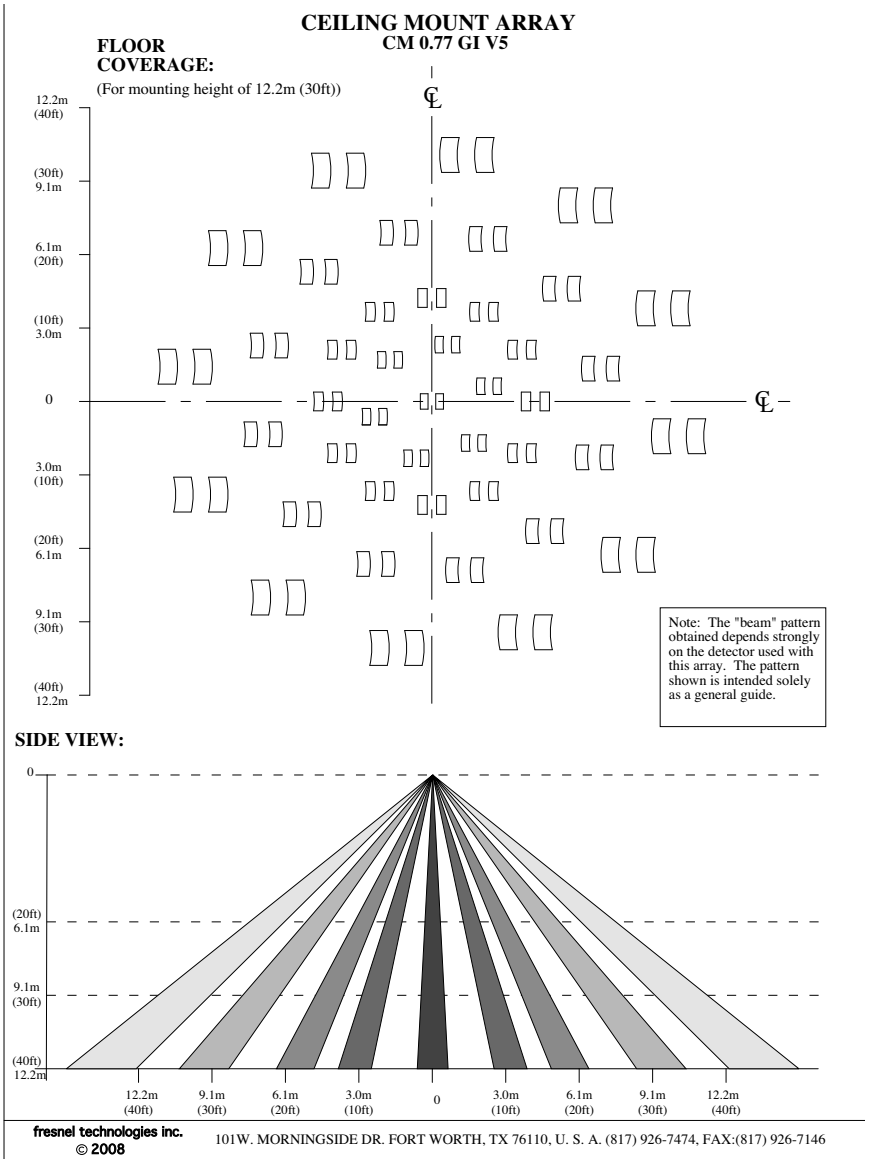


Figure 7. The CM 0.77 GI V3 Lens Specification, #2 of 3

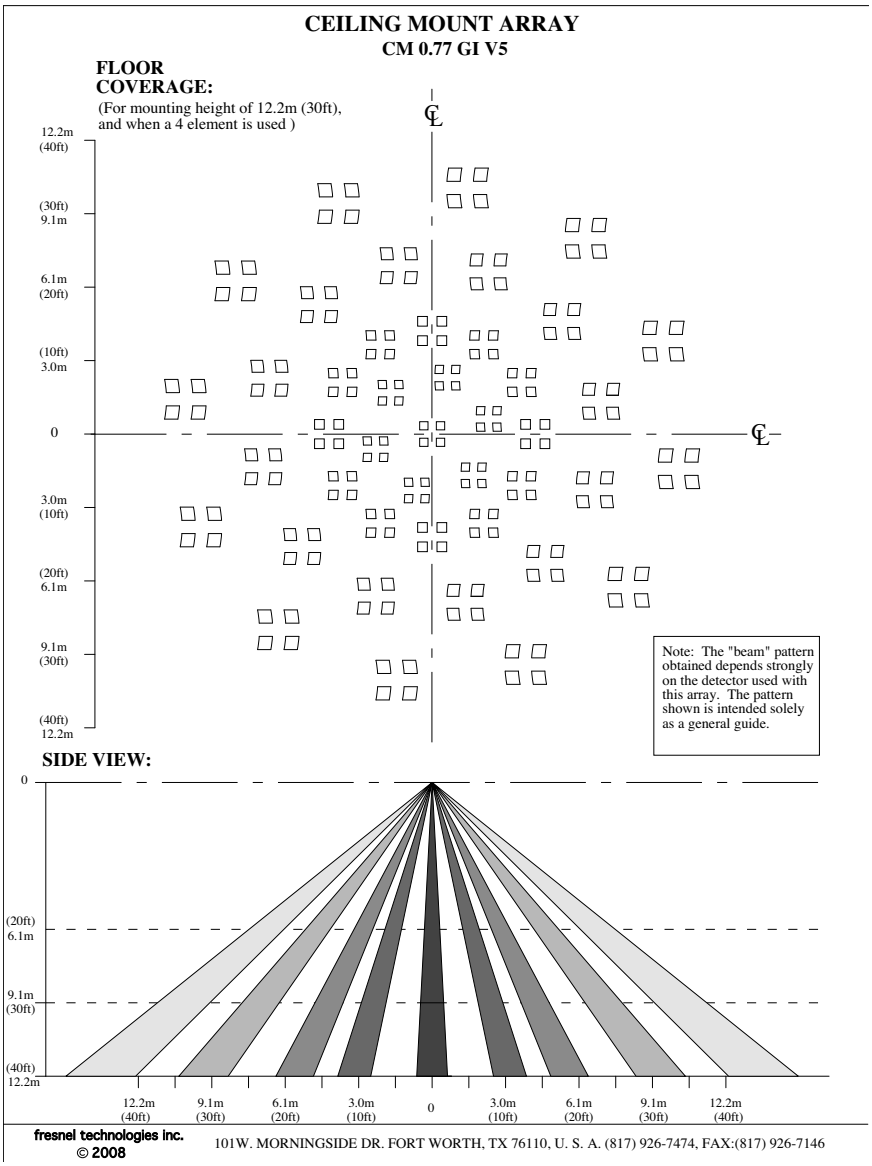


Figure 8. The CM 0.77 GI V3 Lens Specification, #3 of 3

CWM 0.5 GI V1 Lens Specification

The CWM 0.5 GI V1 lens array is intended for both wall and ceiling-mounted applications and is optimized for both dual and quad element pyroelectric detectors. The lens is intended to clip directly into the circuit board over top of the pyroelectric sensor.

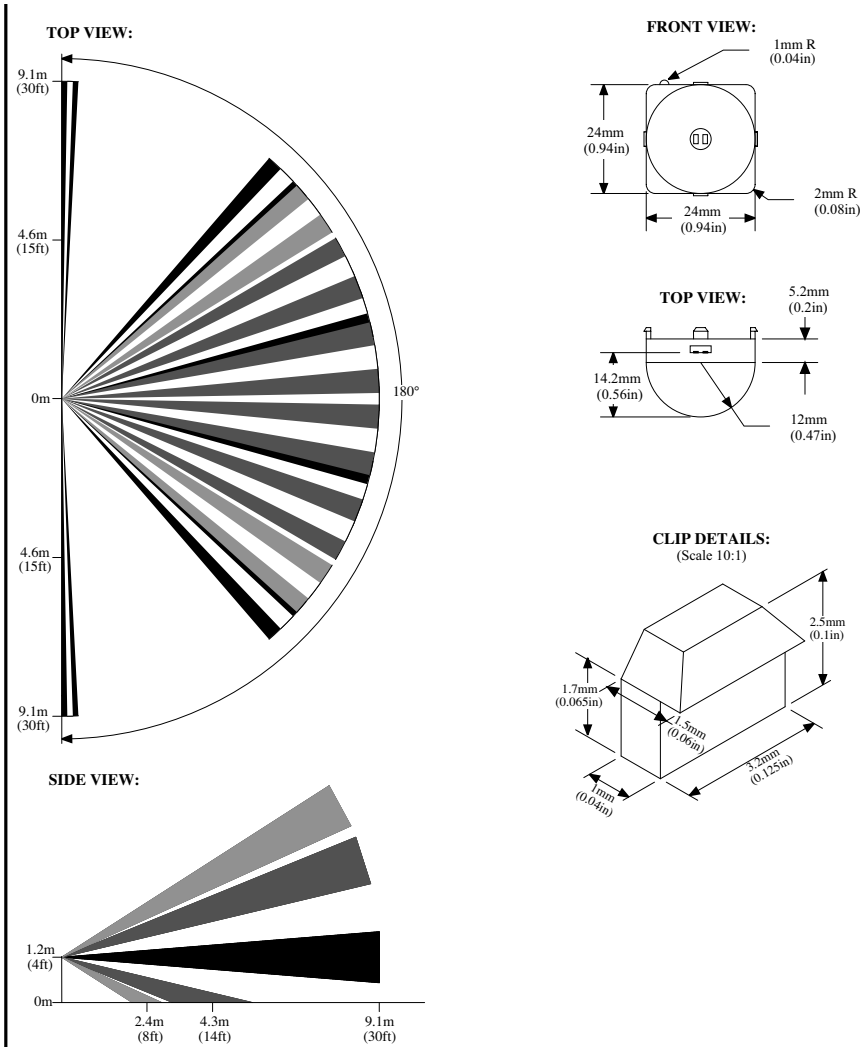


Figure 9. The CM 0.5 GI V1 Lens Specification: Wall Mount

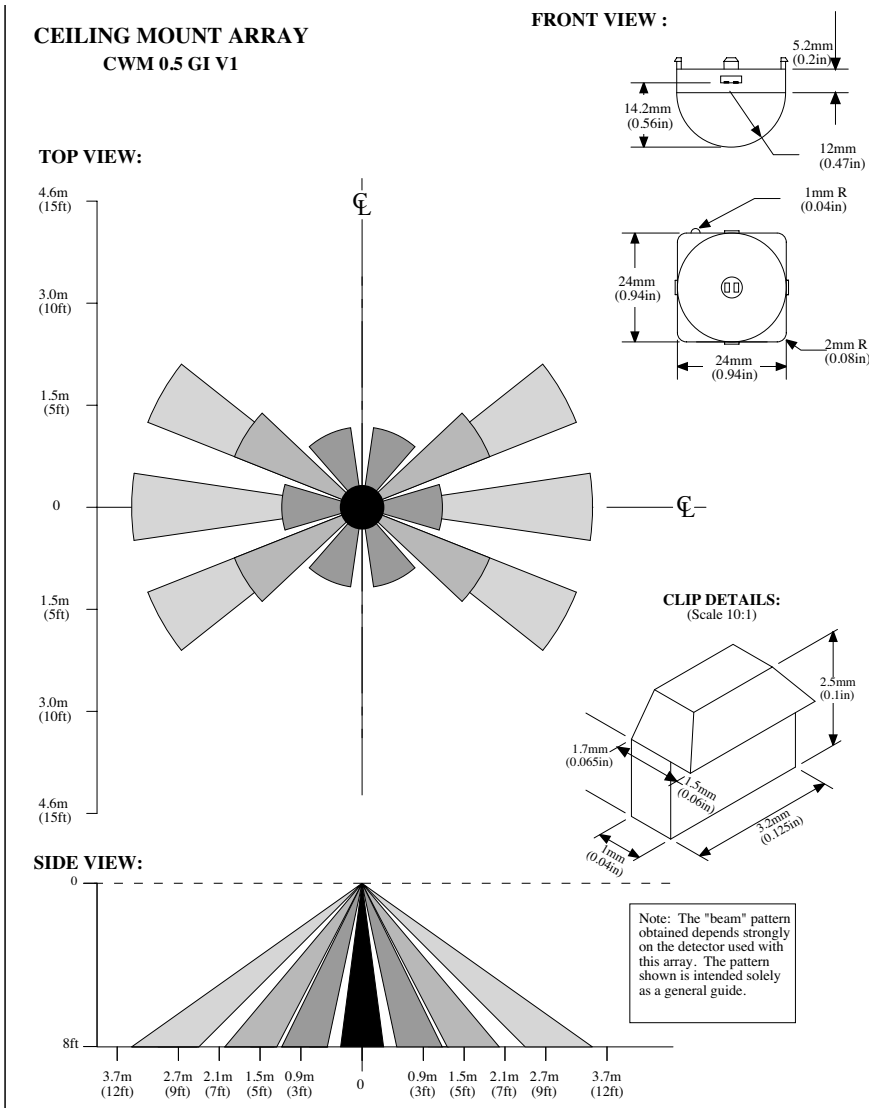


Figure 10. The CM 0.5 GI V1 Lens Specification: Ceiling Mount, #1 of 2

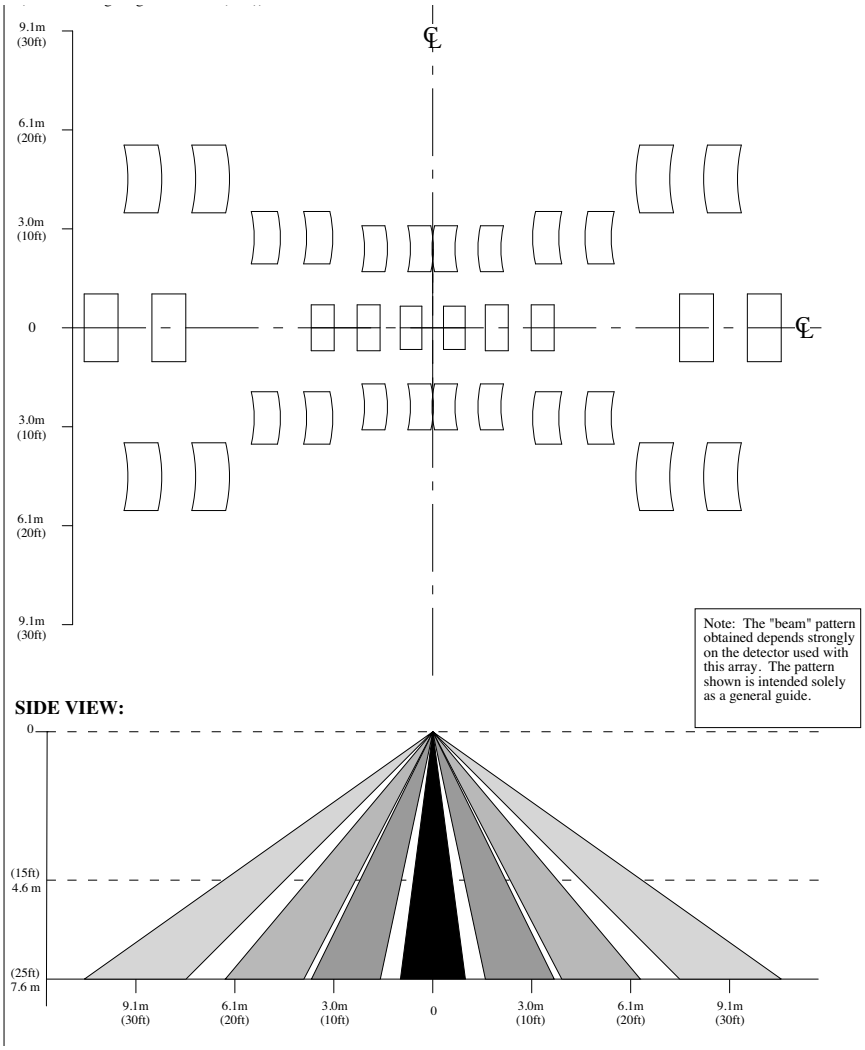


Figure 11. The CM 0.5 GI V1 Lens Specification: Ceiling Mount, #2 of 2

EWA 0.3 GI V2 Lens Specification

The EWA 0.3 GI V2 lens is intended for wall-mounted room occupancy and proximity sensing applications in which an extra-wide sensing angle is required. See Figure 12.

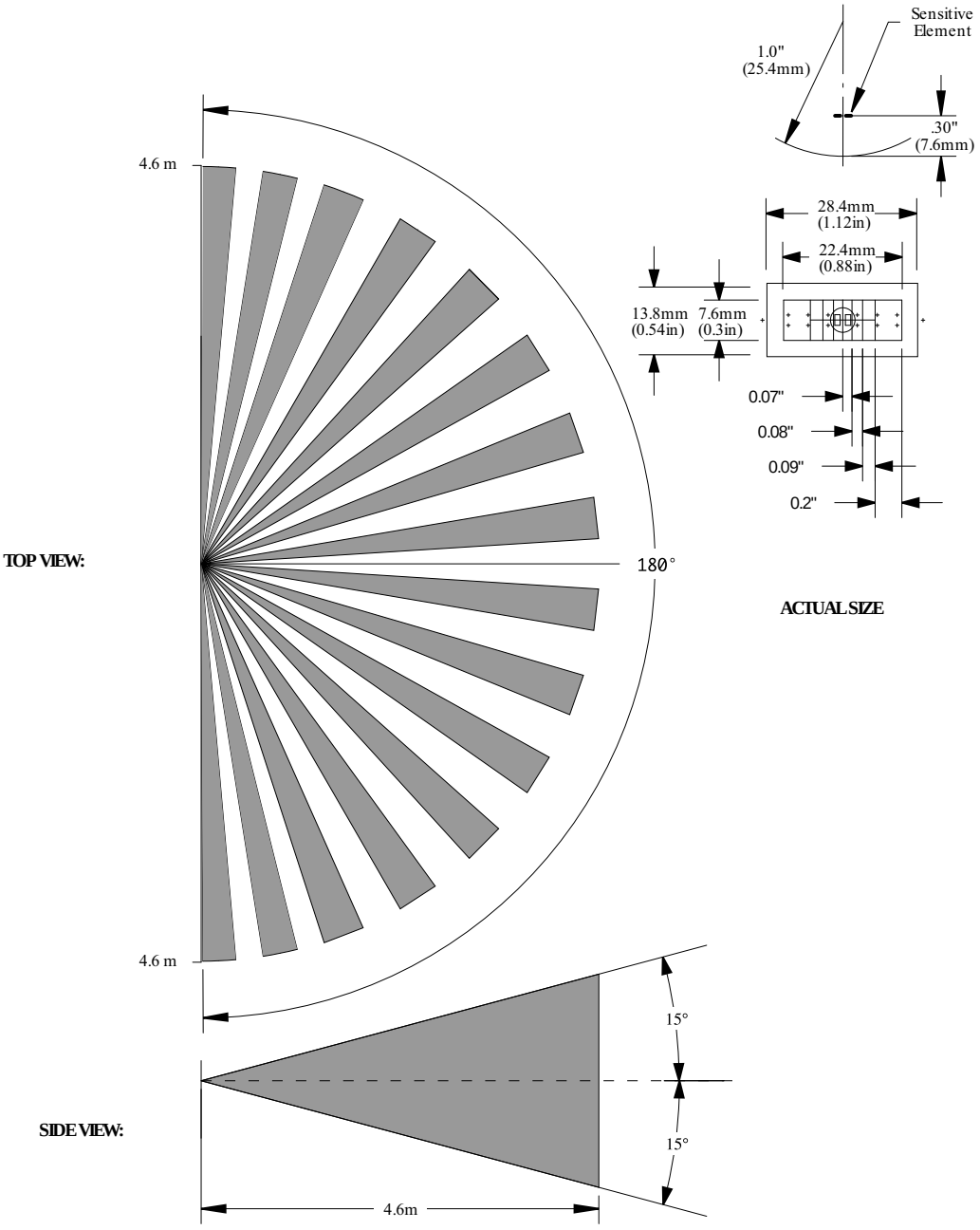


Figure 12. The EWA 0.3 GI V2 Lens Specification, Dimensions

NCL-3B Lens Specification

The NCL-3B lens is intended for wall-mounted entrance and proximity-sensing applications.

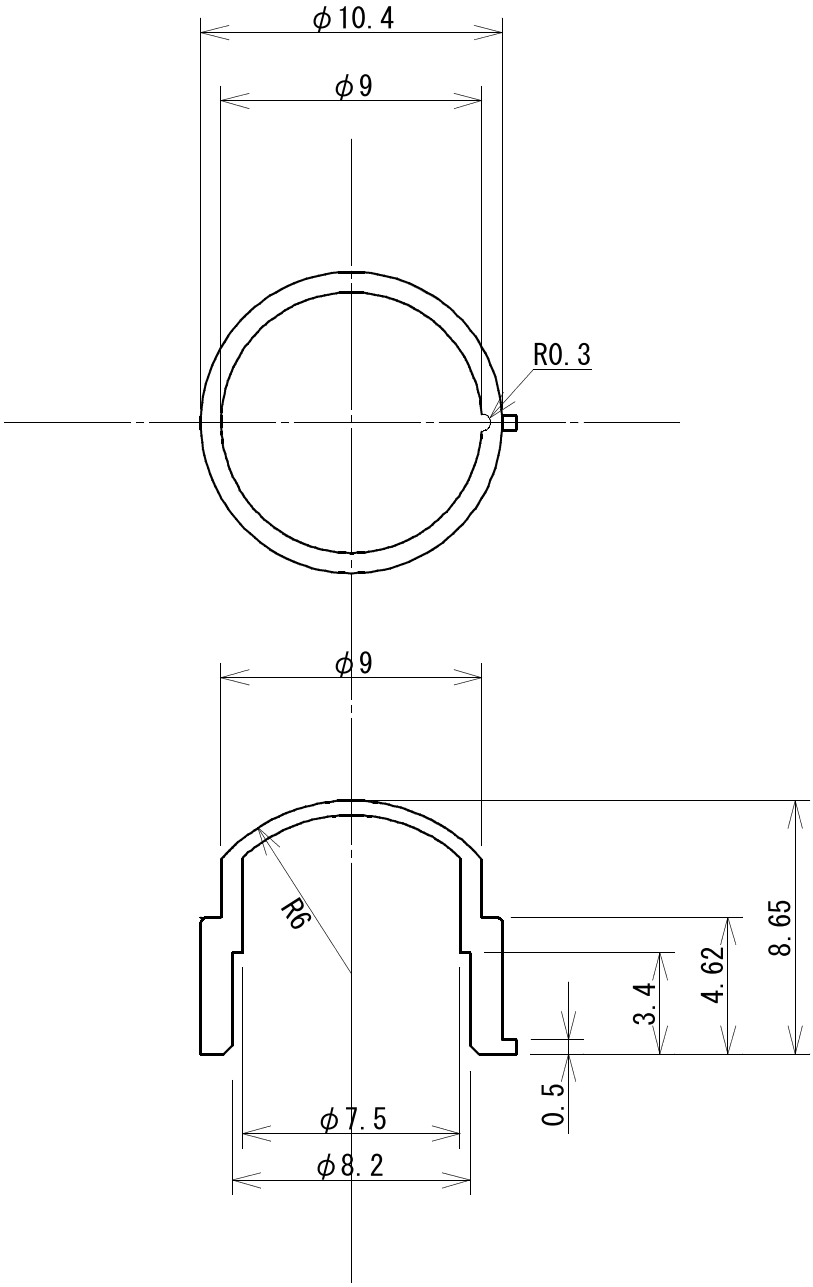


Figure 13. The NCL-3B Lens Dimensions

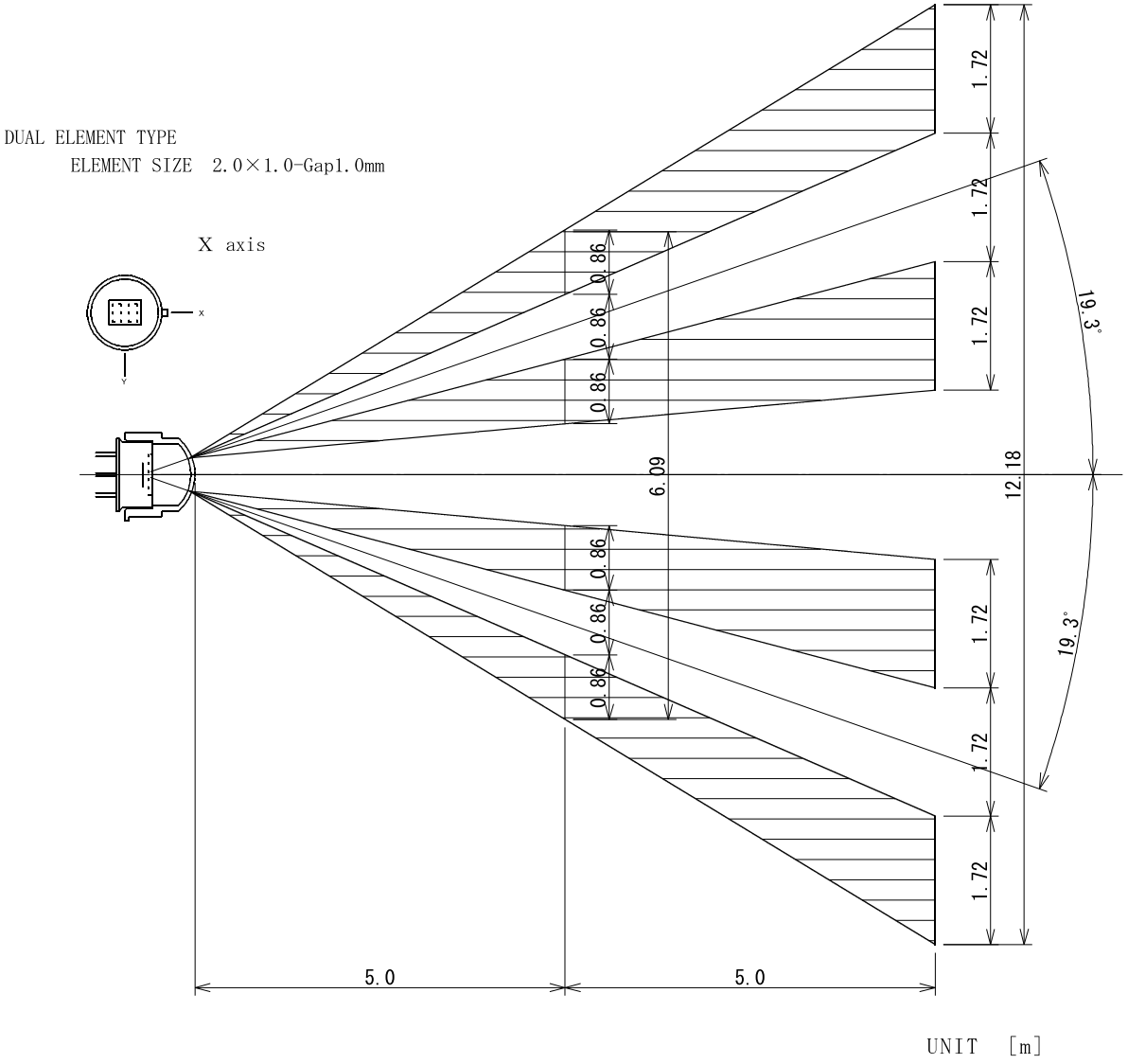


Figure 14. The NCL-3B Lens Specification, X Axis

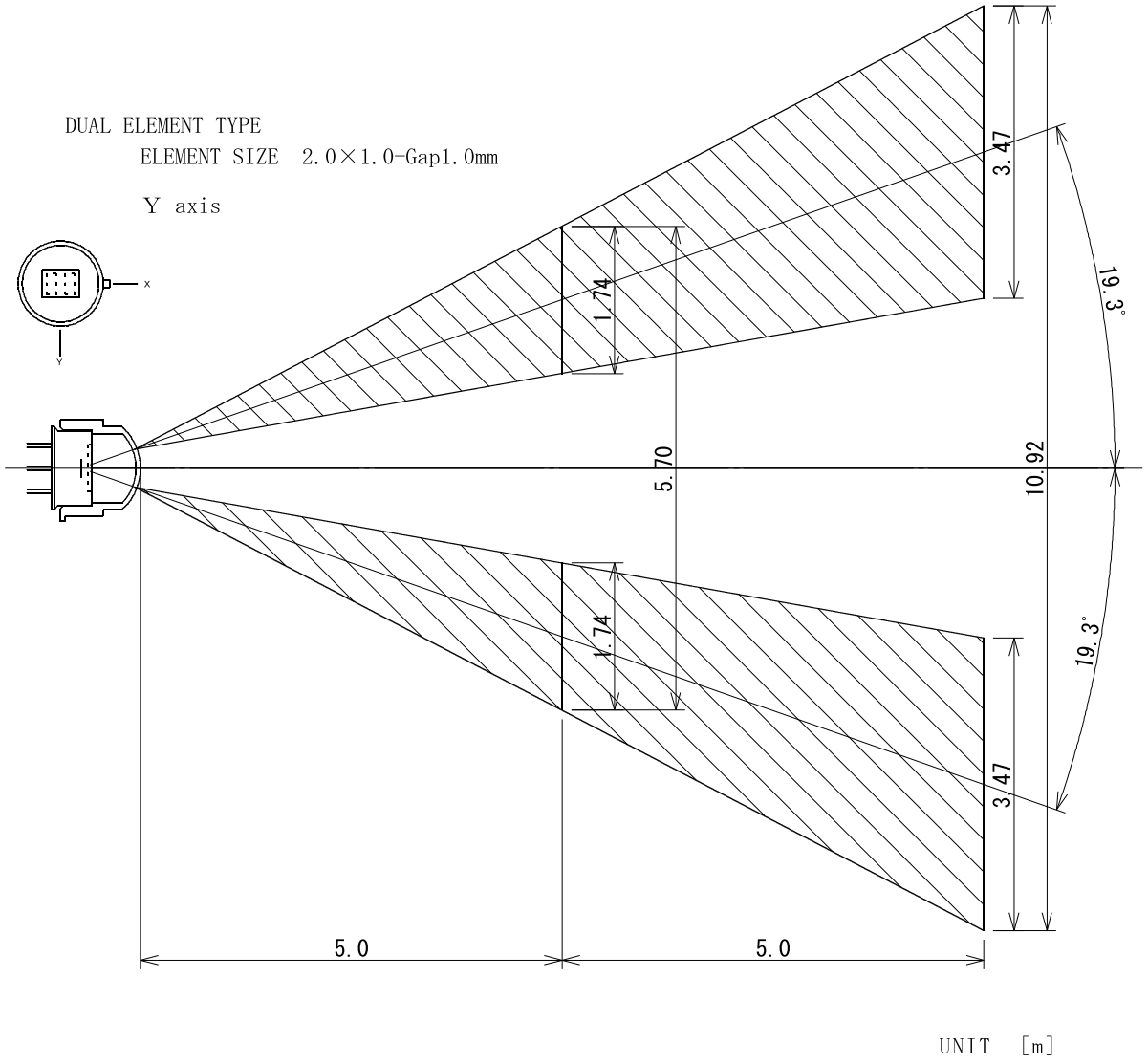


Figure 15. The NCL-3B Lens Specification, Y Axis

NCL-3R Lens Specification

The NCL-3R lens is intended for wall-mounted entrance and proximity-sensing applications. This lens features two orientations, Tab A and Tab B, that can be used with the pyroelectric sensor to provide different beam patterns. Figures 16 through 19.

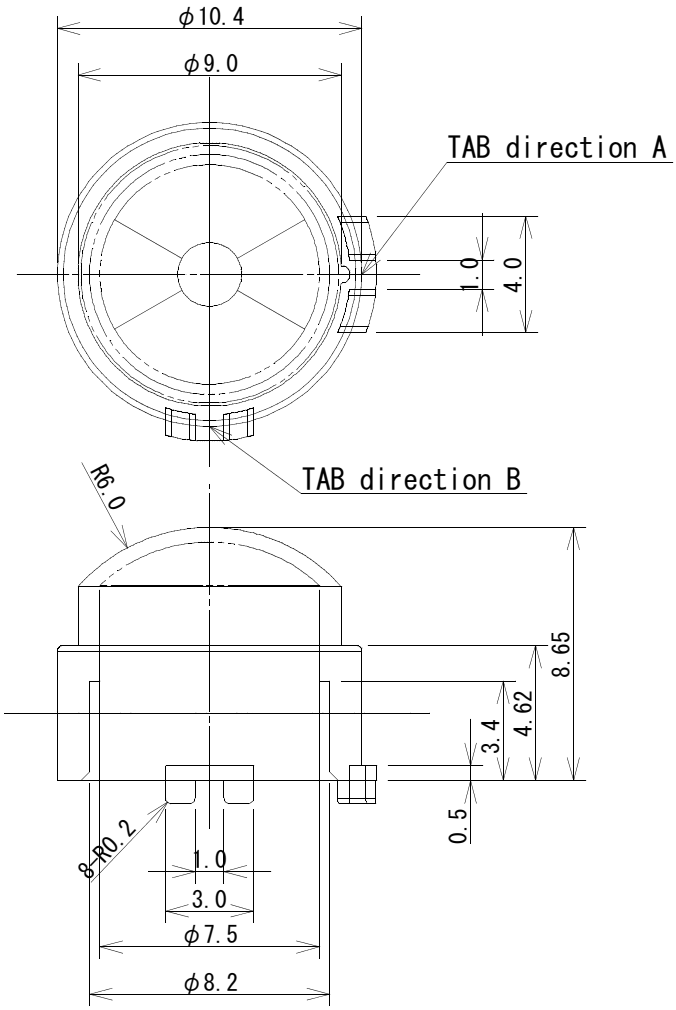


Figure 16. The NCL-3R Lens Specification, Dimensions

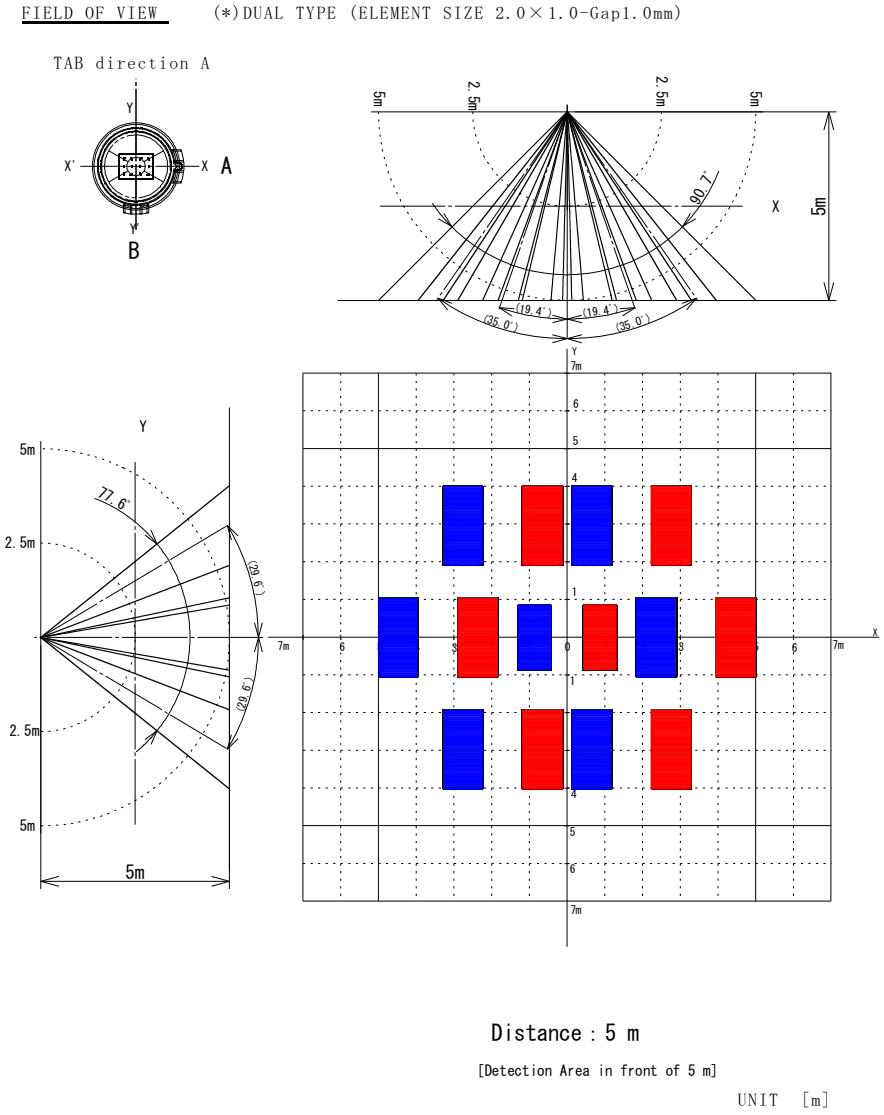


Figure 17. The NCL-3R Dual Element Lens Specification, Tab Direction A, X Axis

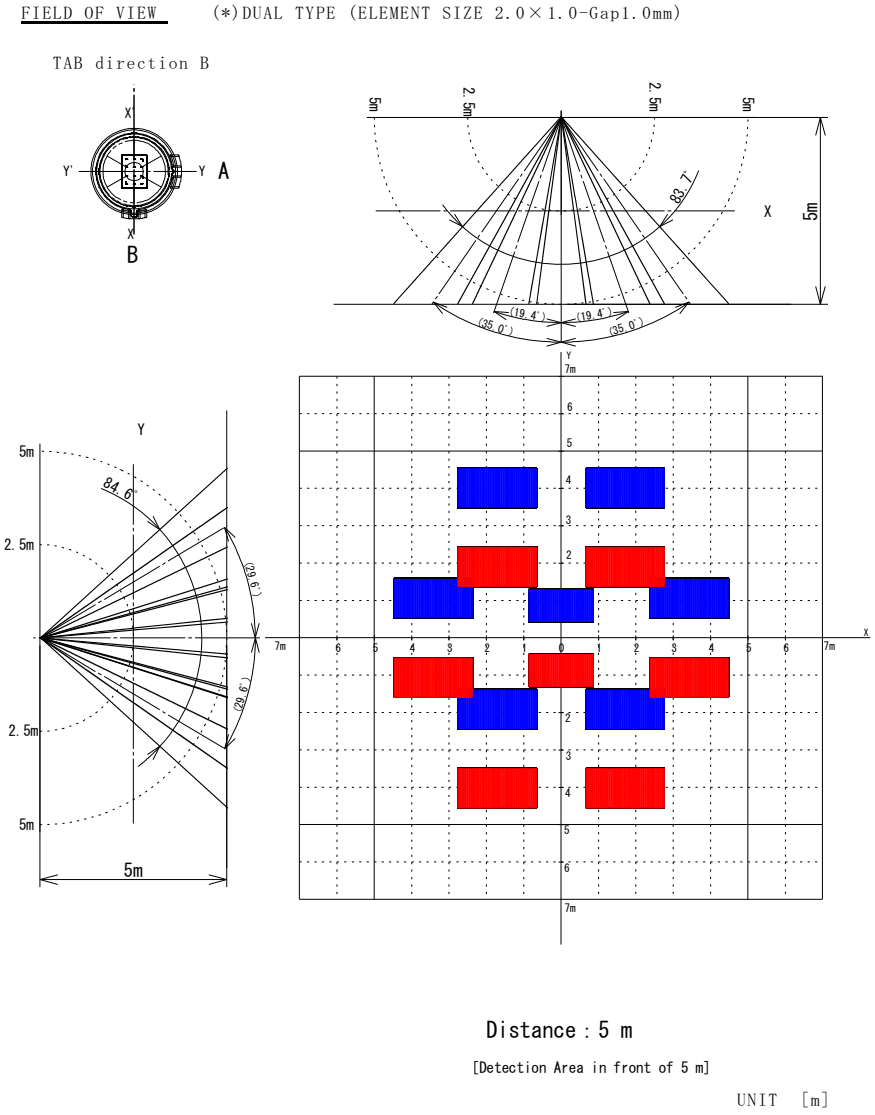


Figure 18. The NCL-3R Dual Element Lens Specification, Tab Direction A, Y Axis

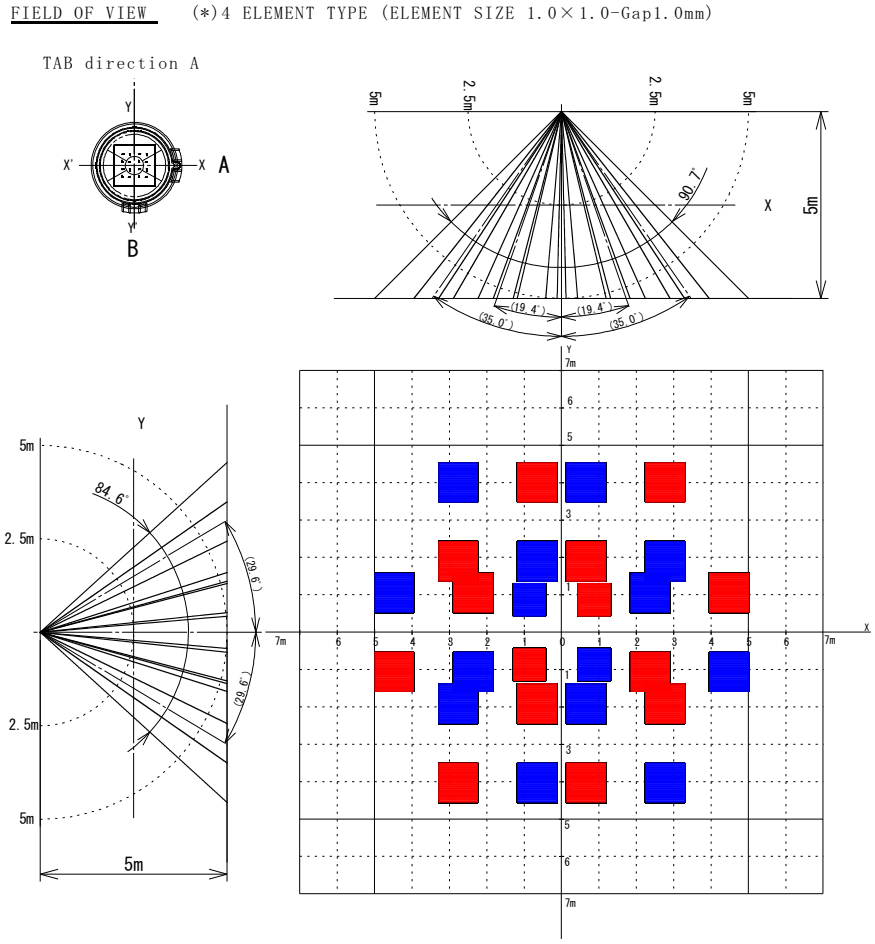


Figure 19. The NCL-3R Quad Element Lens Specification, Tab Direction A, X Axis

NCL-9(26) Lens Specification

The NCL-9(26) lens is intended for ceiling-mounted and other general purpose motion sensing applications. It is optimized for both dual and quad element pyroelectric sensors.

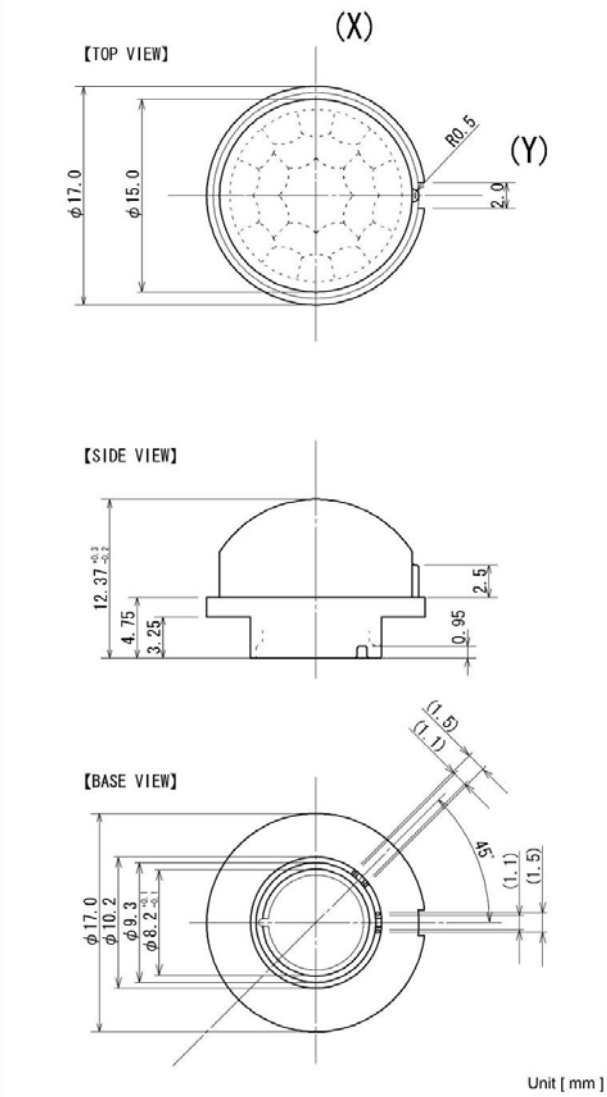
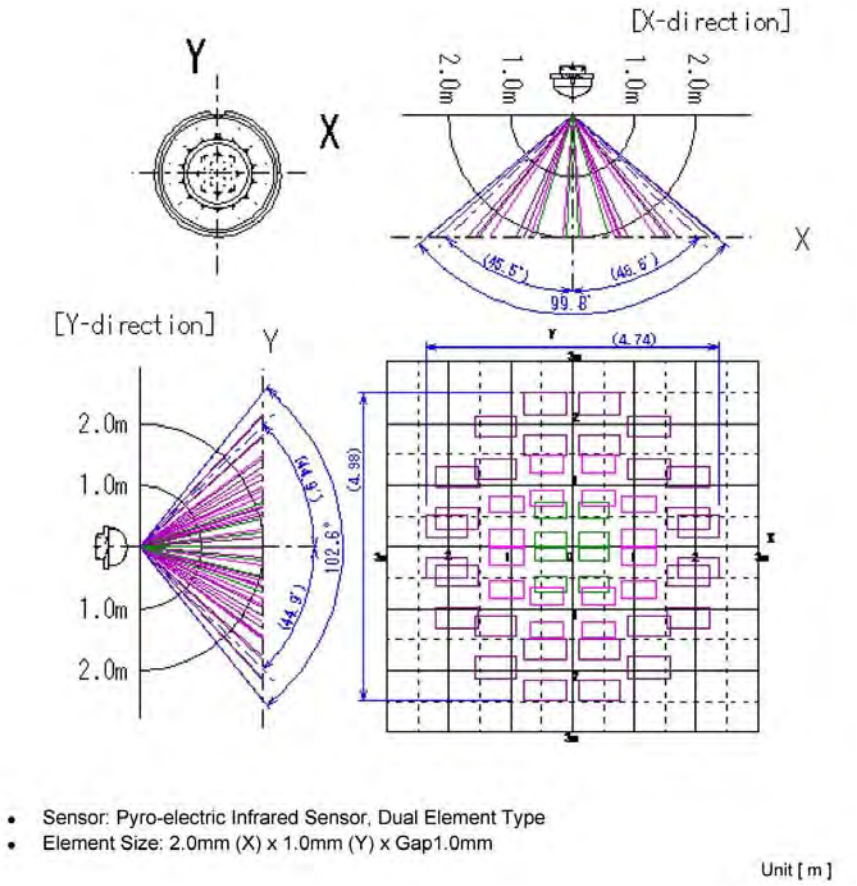


Figure 20. The NCL-9(26) Lens Specification, #1 of 3



- Sensor: Pyro-electric Infrared Sensor, Dual Element Type
- Element Size: 2.0mm (X) x 1.0mm (Y) x Gap1.0mm

Unit [m]

Figure 21. The NCL-9(26) Lens Specification, #2 of 3

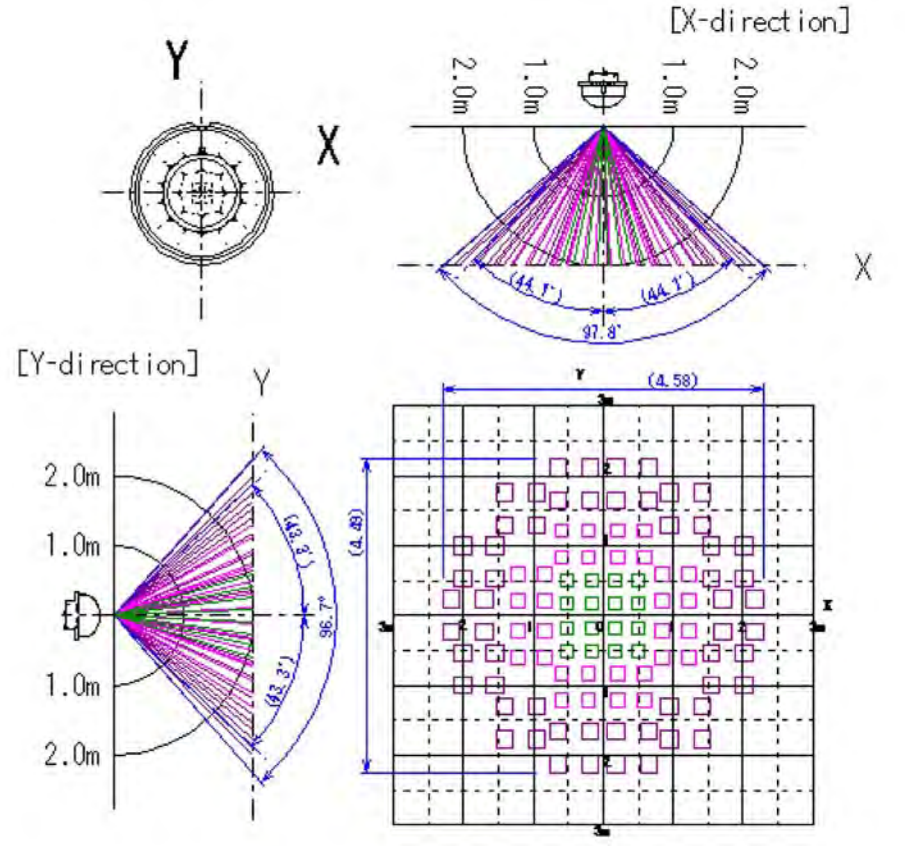


Figure 22. The NCL-9(26) Lens Specification, #3 of 3

NCL-10IL Lens Specification

The NCL-10IL lens is intended for wall-mounted entrance and proximity-sensing applications. This lens features two orientations, Tab A and Tab B, that can be used with the pyroelectric sensor to provide different beam patterns. Refer to Figures 24 and 25 for the Tab A beam patterns and to Figures 26 and 27 for the Tab B beam patterns.

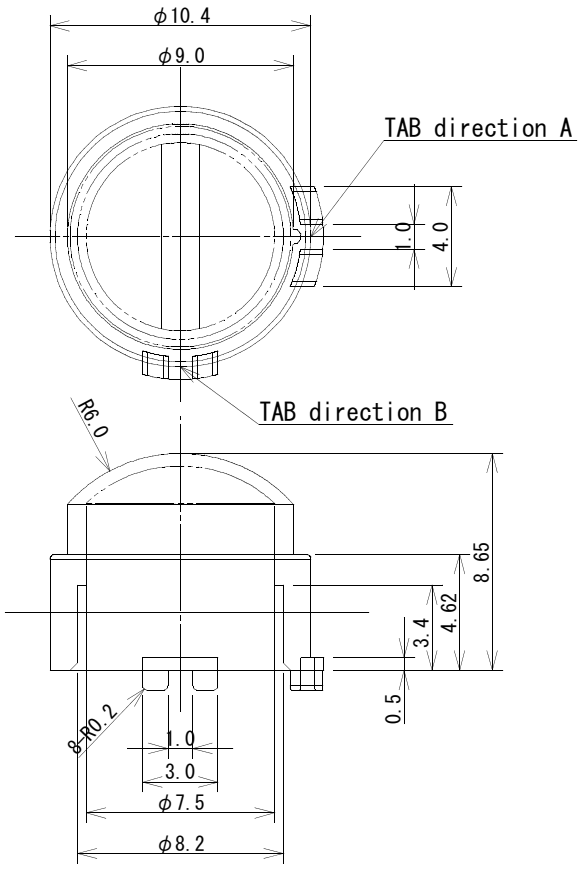


Figure 23. The NCL-10IL Lens Specification, Dimensions

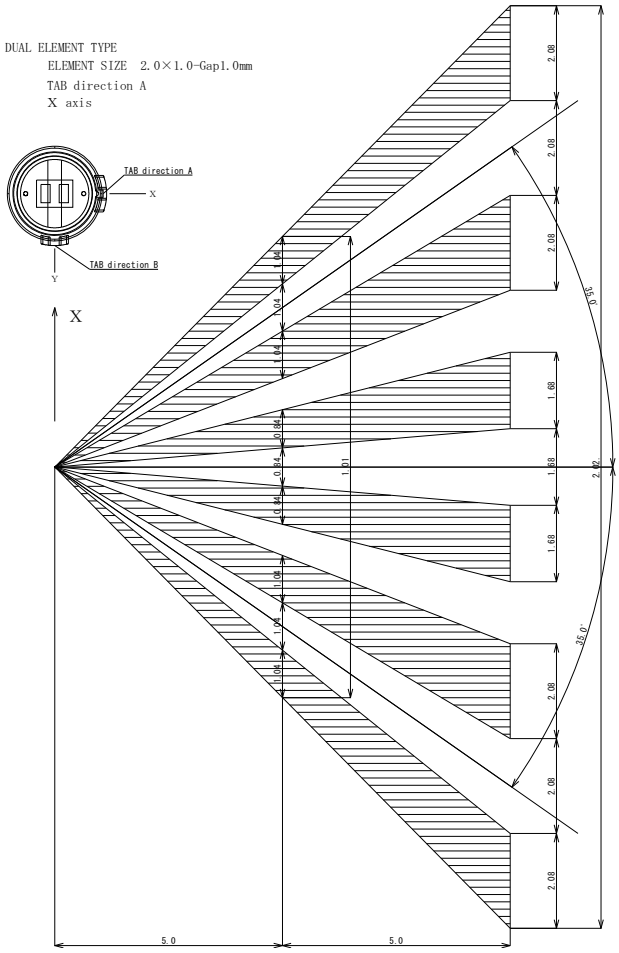


Figure 24. The NCL-10IL Lens Specification, Tab Direction A, X Axis

4 ELEMENT TYPE

ELEMENT SIZE 1.0×1.0-Gap1.0mm

TAB direction A

Y axis

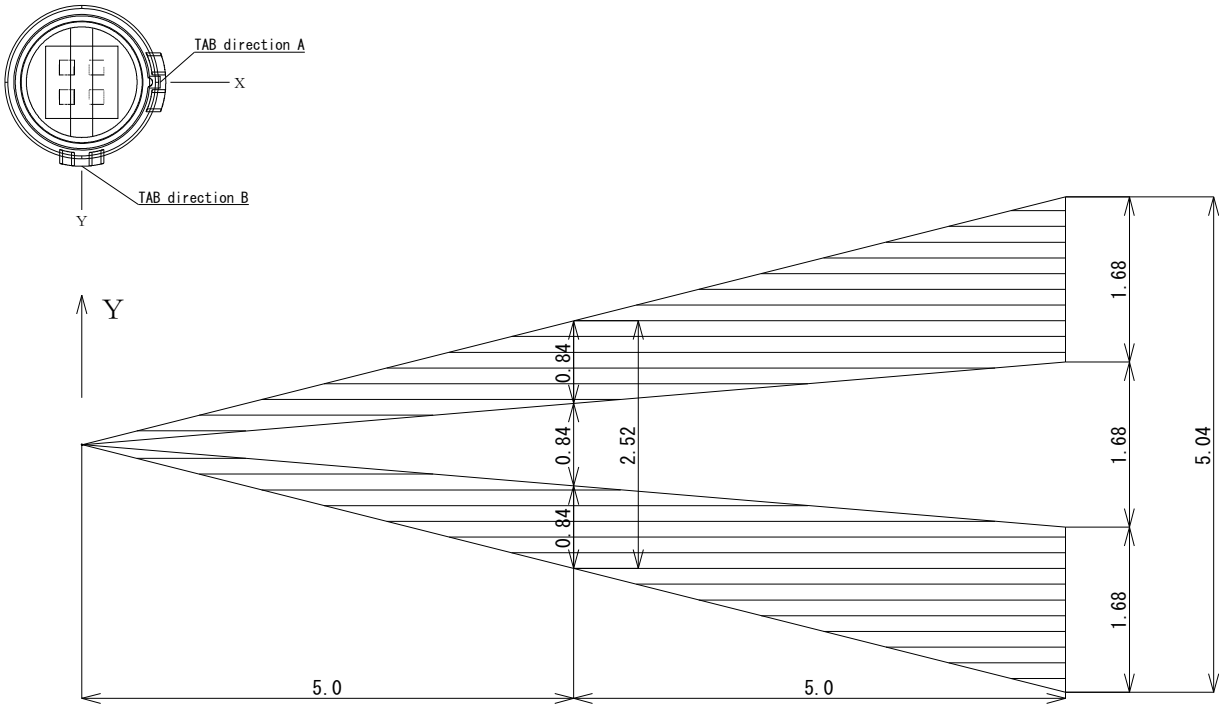


Figure 25. The NCL-10IL Lens Specification, Tab Direction A, Y Axis

4 ELEMENT TYPE

ELEMENT SIZE 1.0×1.0-Gap1.0mm

TAB direction B

X axis

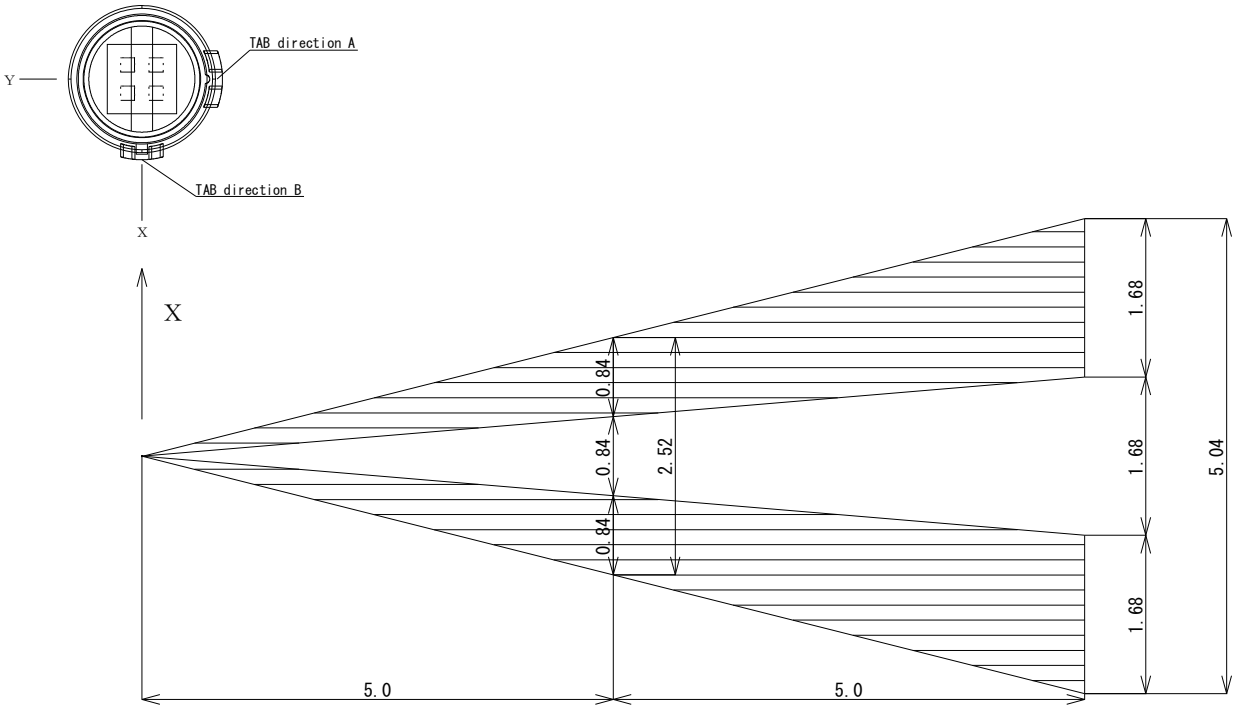


Figure 26. The NCL-10IL Lens Specification, Tab Direction B, X Axis

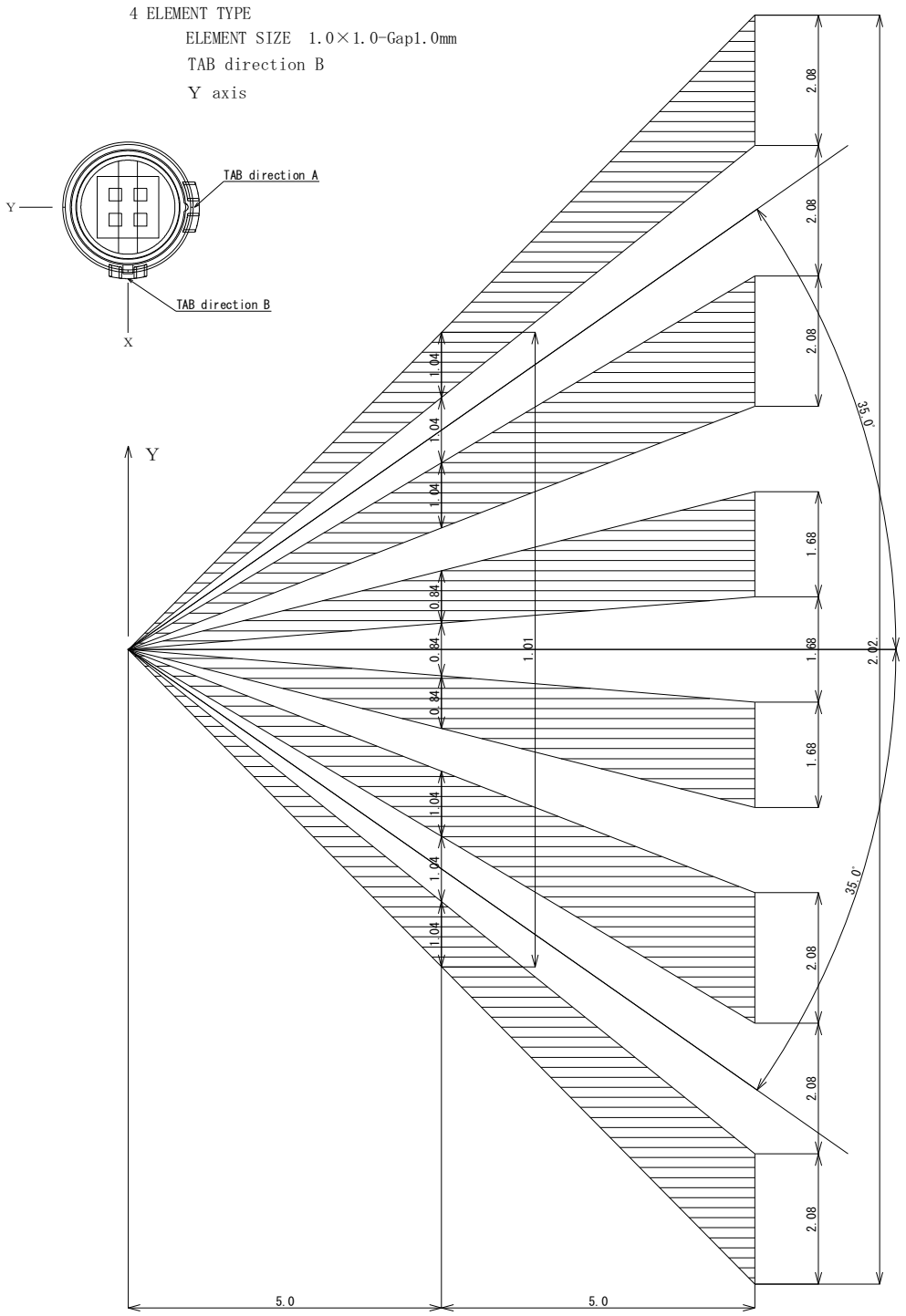


Figure 27. The NCL-10IL Lens Specification, Tab Direction B, Y Axis

NCL-10S Lens Specification

The NCL-10S lens is intended for wall-mounted entrance detection applications wherein directional recognition is required. See Figures 28 and 29.

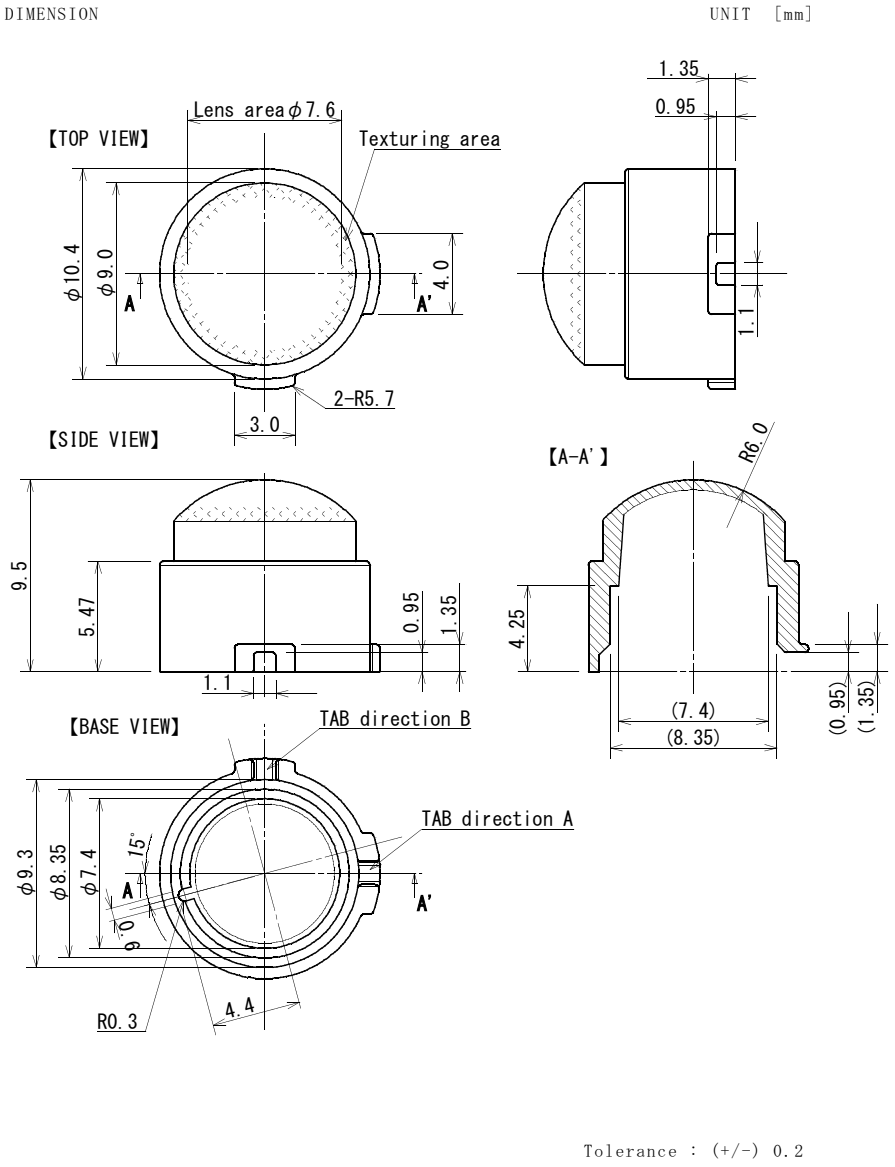


Figure 28. The NCL-10S Lens Specification, Dimensions

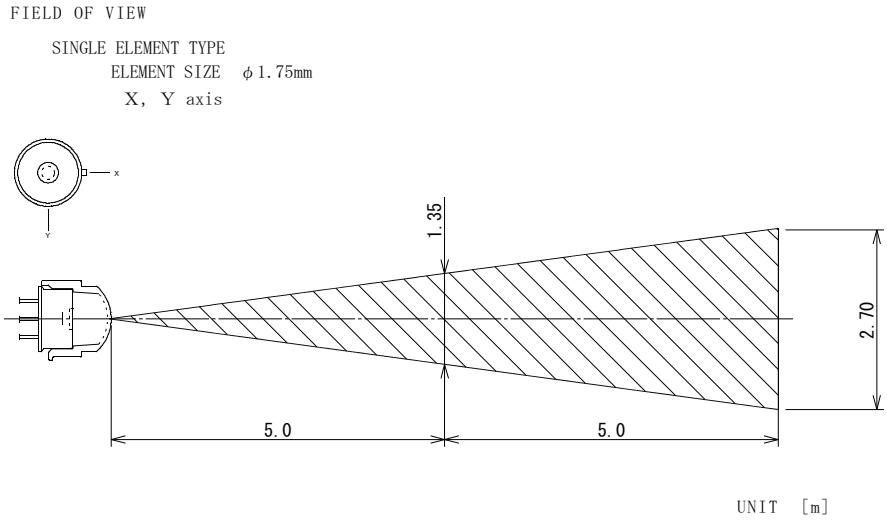


Figure 29. The NCL-10S Dual Element Lens Specification, X/Y Axes

NCL-11 Lens Specification

The NCL-11 lens is intended for wall-mounted room occupancy and proximity sensing applications with 32 detection zones. See Figures 30 and 31.

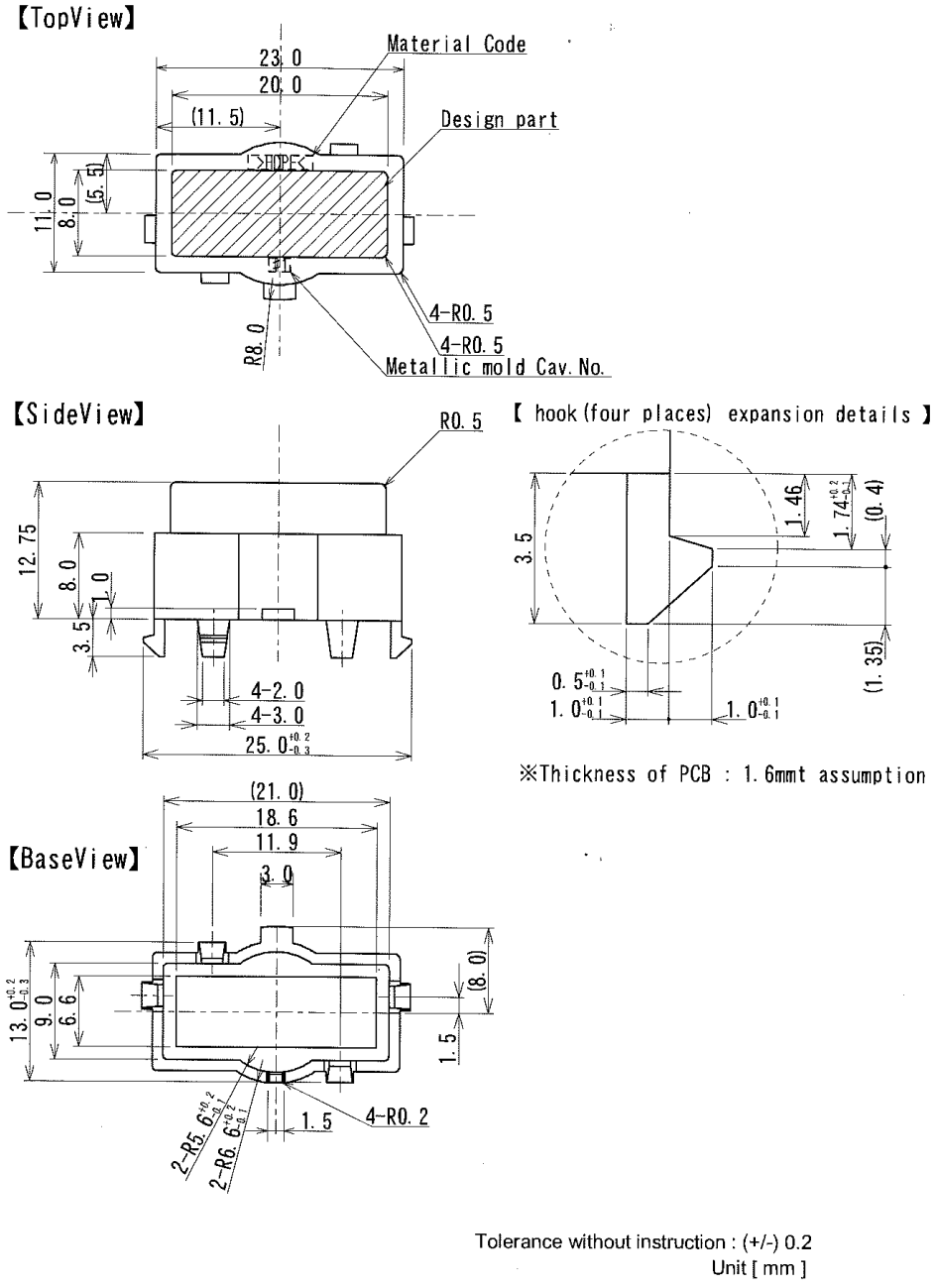
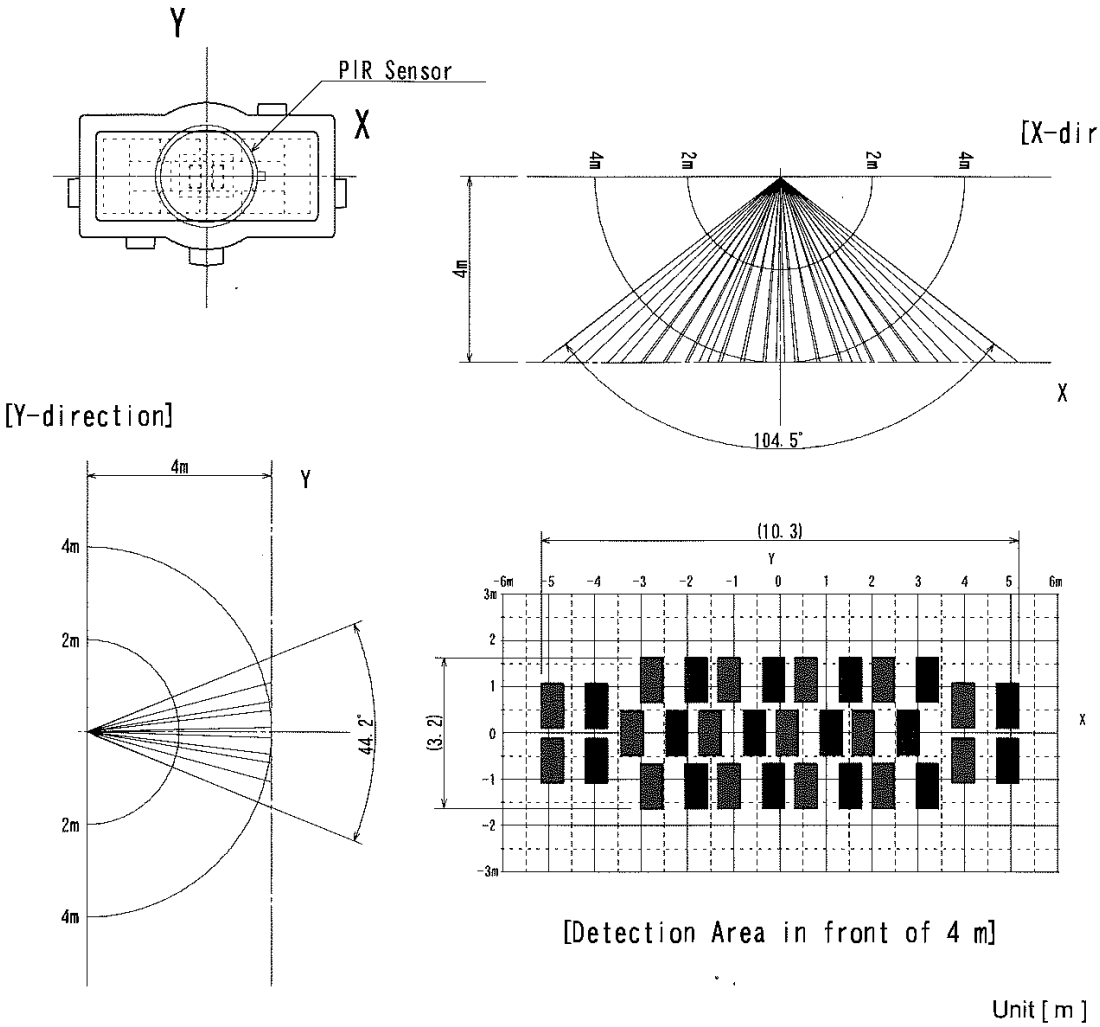


Figure 30. The NCL-11 Lens Specification, Dimensions



*16 zones × dual element = 32 areas

- Sensor: Pyro-electric Infrared Sensor, Dual Element Type
- Element Size: 1.0mm (X) x 2.0mm (Y) x Gap1.0mm

Figure 31. The NCL-11 Detection Area, X/Y Axes

ZMOTION Intrusion Detection Lens Specifications

Figures 34 through 33 provide the zone patterns and mechanical dimensions for the ZMOTION Intrusion Detection family of products. Recommended placement of the pyroelectric sensor is provided with the detector and lens inclined downward at an angle of 12 degrees. If you wish to use a tilt angle other than 12 degrees while maintaining the specified zone patterns, move the pyroelectric sensor up by 0.021" (0.53mm) for each degree less than 12 degrees, or down by the same amount for each degree greater than 12 degrees.

The WA 1.2 GI 12 V4, LR 1.2 GI 12 V3 and VB 1.2 GI V1 lenses can be interchanged in the same end product without modifications to the placement or angle of the lens.

These lenses may also be used in nonintrusion applications. For additional lenses that do not require security/intrusion detection capabilities, refer to the ZMOTION Detection and Control Lens Specifications section on page 6.

LR 1.2 GI 12 V3 Lens Specification

The LR 1.2 GI 12 V3 lens array is optimized for dual-element pyroelectric sensors in long-range corridor security applications. It is normally used with the grooved side facing the pyroelectric detector, and curved at a 1.2 inch (30.5mm) radius about the sensitive area of the detector. The detector and the lens array should be inclined downward at an angle of 12 degrees. If you wish to use a tilt angle other than 12 degrees while maintaining the specified zone pattern, move the pyroelectric sensor up by 0.021" (0.53mm) for each degree less than 12 degrees, or down by the same amount for each degree greater than 12 degrees. The detector position should be 0.812" (20.6 mm) below the upper edge, and centered left-to-right.

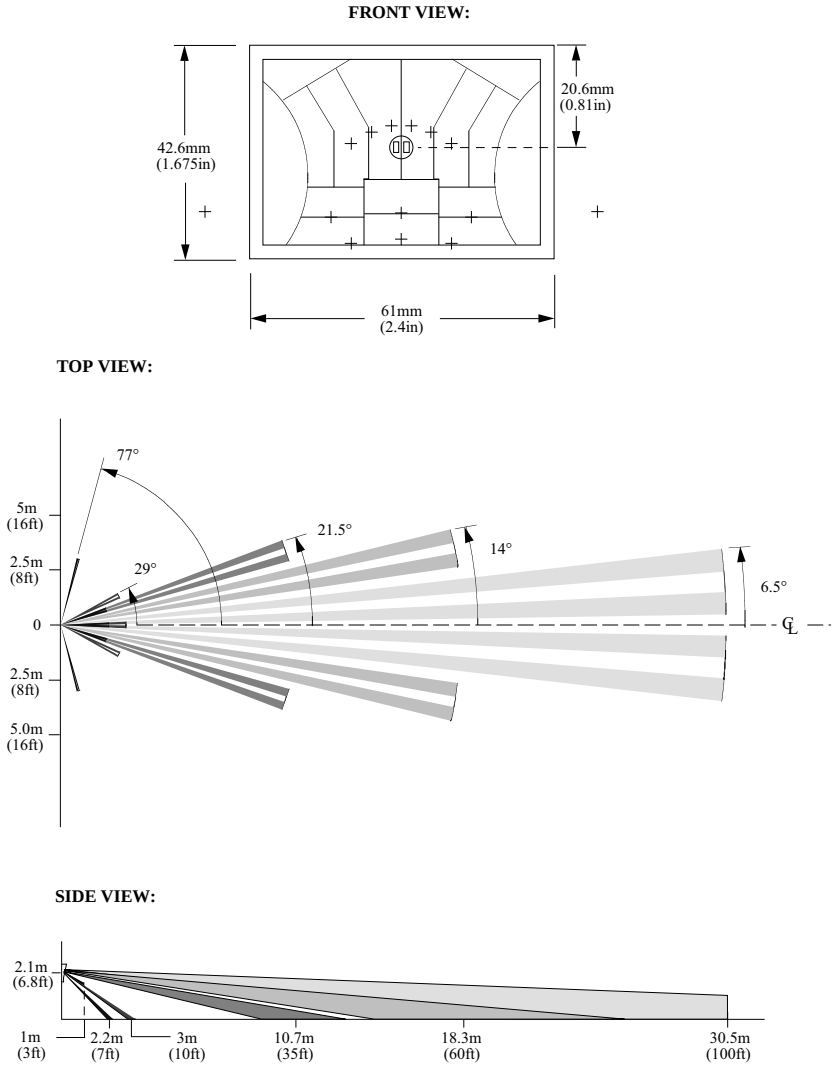


Figure 32. LR 1.2 GI 12 V3 Lens Specification

VB 1.2 GI V1 Lens Specification

The VB 1.2 GI V1 lens array is optimized for dual-element pyroelectric sensors in vertical barrier or curtain-type security applications. It is normally used with the grooved side facing the pyroelectric detector, and curved at a 1.2 inch (30.5 mm) radius about the sensitive area of the detector. The detector and the lens array should be inclined downward at an angle of 12 degrees. If you wish to use a tilt angle other than 12 degrees while maintaining the specified zone pattern, move the pyroelectric sensor up by 0.021" (0.53mm) for each degree less than 12 degrees, or down by the same amount for each degree greater than 12 degrees. The detector position should be 0.812" (20.6 mm) below the upper edge, and centered left-to-right.

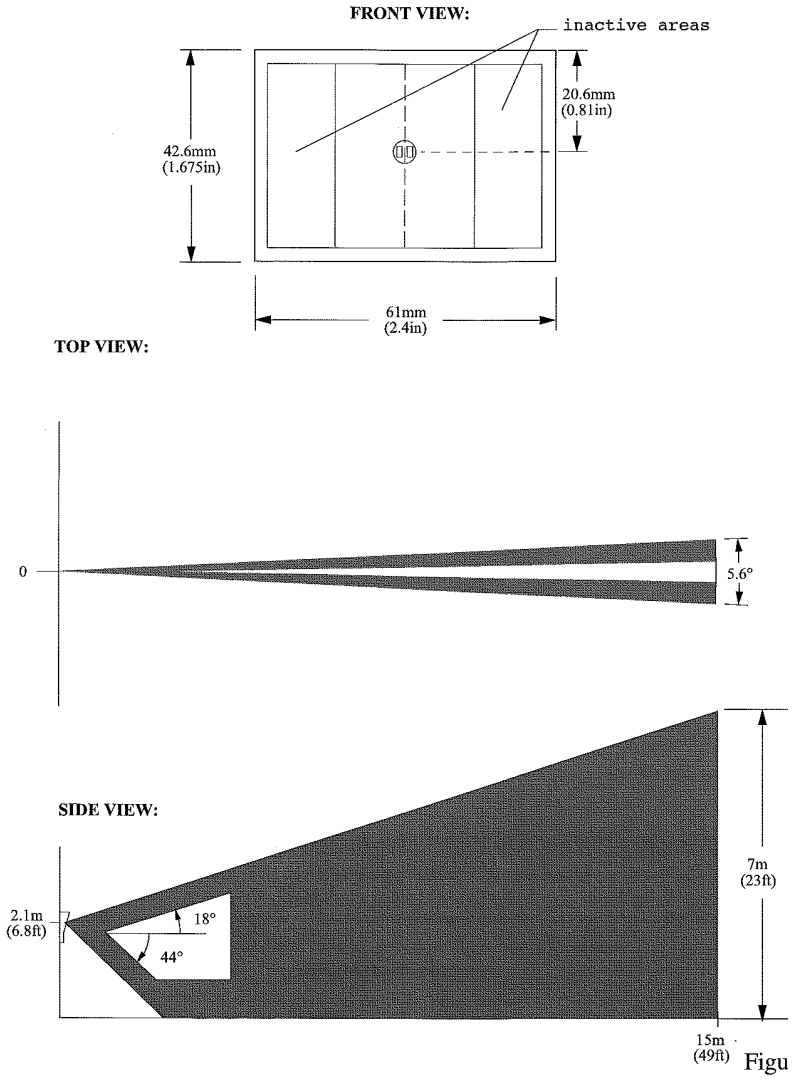


Figure 33. VB 1.2 GI V1 Lens Specification

WA 1.2 GI 12 V4 Lens Specification

The WA 1.2 GI 12 V4 lens array is optimized for dual-element pyroelectric sensors in large-area security applications. It is normally used with the grooved side facing the pyroelectric detector, and curved at a 1.2 inch (30.5mm) radius about the sensitive area of the detector. The detector and the lens array should be inclined downward at an angle of 12 degrees. If you wish to use a tilt angle other than 12 degrees while maintaining the specified zone pattern, move the pyroelectric sensor up by 0.021" (0.53mm) for each degree less than 12 degrees, or down by the same amount for each degree greater than 12 degrees. The detector position should be 0.812" (20.6mm) below the upper edge, and centered left-to-right.

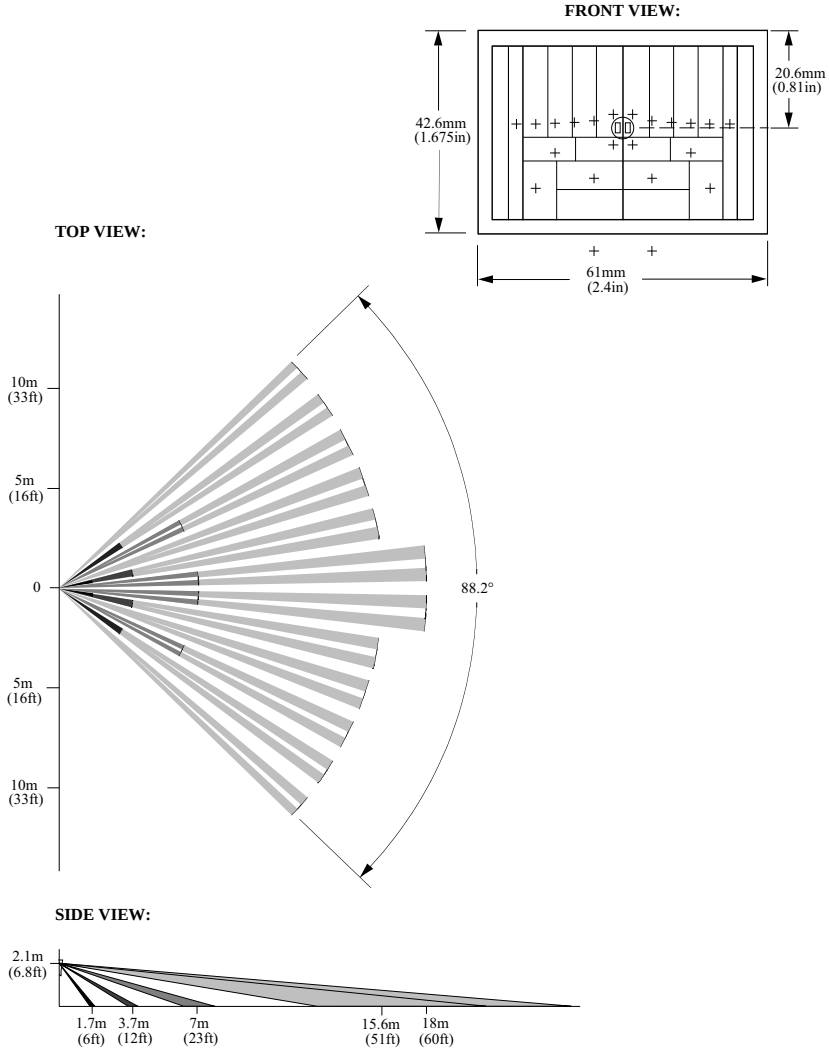


Figure 34. WA 1.2 GI 12 V4 Lens Specification

Related Documents

Additional information about the ZMOTION Families of Motion Detection MCUs can be found in the following documents, which are available from the Zilog website at www.zilog.com.

Document Number	Description
PB0225	ZMOTION Detection and Control Family Product Brief
PS0285	ZMOTION Detection and Control Family Product Specification
PB0230	ZMOTION Intrusion Detection Product Brief
PS0288	ZMOTION Intrusion Detection Product Specification
PS0228	Z8 Encore! XP® F082A Series Product Specification
AN0307	ZMOTION Detection Module Application Walkthrough
AN0309	ZMOTION High Brightness White LED Lighting Application Note
WP0017	A New PIR Motion Detection Architecture White Paper
WP0018	ZMOTION Detection Lens and Pyro Sensor Configuration Guide
Other ZMOTION Family Products	
PB0223	ZMOTION Detection Module Product Brief
PS0284	ZMOTION Detection Module Product Specification

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