

## 6960 Series

## dual imaging positioner system

Allows custom camera site design with off-the-shelf economy

Multiple imaging technology choices for maximum flexibility

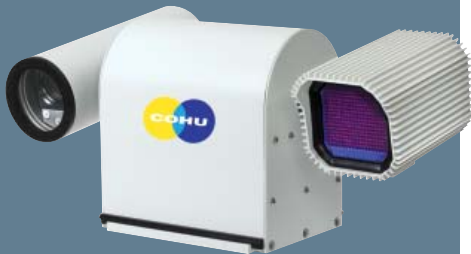
IP67 camera housing for long, reliable operation

Heavy-duty, precision, environmentally-protected positioner

Programmable presets and tours

Embedded multi-protocol camera and positioner control

*Model 6960 with day/night camera and IR illuminator for enhanced night vision*



- *Border Protection*
- *Power Plants*
- *Water Departments / Reservoirs*
- *High Value Asset Monitoring*
- *Process / Effluent Monitoring*
- *Perimeter Security*
- *Military Surveillance / Targeting*



The Cohu 6960 Series is a full-spectrum camera site surveillance solution in one integrated package.

Two cameras on one positioner provide reliable surveillance or process monitoring in daylight, no light, and obscured visibility conditions. Select a thermal imager for extreme low light conditions, or environments clouded by haze, rain, smoke, or fog. A second camera is used for precise recognition, identification, or assessment. The day/night camera provides sharp color images in the daylight. When the sun goes down, the camera automatically switches to a monochrome mode that can still provide details in very low light conditions.

What sets the 6960 Series apart is that it can be fully customized at off-the-shelf economy. The 6960 Series provides additional value by using Cohu's dependable *i-Series* design for

fast and accurate positioning with the ability to look straight up and down and in a 360° sweep. Our legendary IP67 camera enclosure provides a pristine operating environment for reliable operation and long life.

The 6960 Series is a total site surveillance solution. Cohu designed this product to meet stringent quality objectives and demanding environmental requirements at a price that makes it affordable to all levels of security professionals.

This functionality is ideal for both intrusion detection and assessment of targets.

This datasheet describes the positioner and current imager and illuminator options. Consult with your Cohu sales engineer for other components which may be available.

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This camera system has been designed to meet the customized requirements of today's security professionals with astonishing off-the-shelf economy.

### DAY/NIGHT OPTICAL CAMERA

A Cohu CCD day/night camera is the ideal companion to a thermal imager for the intuitive visual information it provides. A thermal camera tells you something is out there; a Cohu high performance camera helps you see what it is. The camera features 540 lines of resolution with automatic day/night switching technology to assure vivid color images during daylight and high sensitivity monochrome images afterdark.

### aSi MICROBOLOMETER THERMAL IMAGER

The Cohu 6960 thermal camera may be ordered in one of two Focal Plane Arrays (FPA) for NTSC or PAL: 320 x 240 and 640 x 480 NTSC or 384 x 288 and 640 x 480 PAL.

The 640 x 480 detector provides a 307,200 pixel resolution, versus 76,800

pixels in a 320 x 240 detector. The higher resolution option offers greater ability to mark small targets at further distances. Use the chart below to determine the best sensor for your application.

The microbolometer image sensor provides 8-14  $\mu\text{m}$  spectral range, best for short-to-medium distances and for wide areas of view. It is perfect for those applications where the distance being monitored is less than 5 Km. There are five different color pallets available within the camera.

Cohu offers multiple lens choices to optimize the camera's field of view to the applications and to assure that you get the image you're looking for.

The thermal imager features a remote focusing technique that moves the focal plane array, allowing the use of fixed focus lenses rather than costly motorized lens assemblies. The result is a simplified design with a sealed lens assembly.

### IR ILLUMINATOR

An IR illuminator can be selected to match the camera on the opposing side.

This design allows evenly distributed illumination with viewing distances over 200 meters (660 feet). Another advantage is the low power consumption and long life.

The Cohu camera/illuminator interface utilizes the ambient light sensor of the illuminator to control the day/night rollover of the camera. This method provides for the full monochrome capability of the camera by preventing it from reverting to the day mode when the IR level generated by the illuminator is present. Manual override of the illuminator is available.

### COHU'S HIGHER STANDARDS

Because it is made by Cohu Electronics, you can be assured that the 6960 Series is engineered for reliability and value. The camera is protected by our legendary IP67 camera enclosure that shields your investment from intrusion of water, pollutants and corrosives that degrade the camera. This technology insures years of clean, reliable images and backs it with a world-class warranty.

## What will LWIR imaging get me?

The process of actually seeing an object with a thermal imager is categorized as detecting, recognizing, or identifying the object. To detect a moving target, the critical dimension of the object must be covered

by two or more pixels of the camera sensor. An increasing number of pixels covering the object determines the ability to recognize or identify the object. The figures shown below are generalities based upon NV-Therm, a commonly-accepted form of measurement used by the US Army. Use these figures as an estimate only.

LWIR Cameras								
OBJECT OF INTEREST			HUMAN (1m x 1m target)			VEHICLE (3m x 3m target)		
Lens	Sensor	AFV (Deg°)	Detect	Recognize	Identify	Detect	Recognize	Identify
13mm	320 x 240 (35 $\mu\text{m}$ )	50 x 38	260m	42m	16m	728m	119m	67m
	640 x 480 (25 $\mu\text{m}$ )	70 x 55	265m	57m	26m	780m	156m	68m
25mm	320 x 240 (35 $\mu\text{m}$ )	25 x 20	500m	80m	30m	1.4km	230m	130m
	640 x 480 (25 $\mu\text{m}$ )	36 x 28	510m	110m	50m	1.5km	300m	130m
50mm	320 x 240 (35 $\mu\text{m}$ )	12.6 x 9.8	1.0km	150m	60m	2.7km	450m	230m
	640 x 480 (25 $\mu\text{m}$ )	18 x 14	1.0km	220m	100m	2.9km	600m	270m
75mm	320 x 240 (35 $\mu\text{m}$ )	9.5 x 7.4	1.45km	230m	90m	3.95km	685m	330m
	640 x 480 (25 $\mu\text{m}$ )	13.5 x 10.5	1.5km	345m	150m	4.2km	900m	410m
100mm	320 x 240 (35 $\mu\text{m}$ )	6.3 x 4.9	1.9km	310m	120m	5.2km	920m	430m
	640 x 480 (25 $\mu\text{m}$ )	9 x 7	2.0km	470m	200m	5.5km	1.2km	550m

Optical Day/Night Cameras							
OBJECT OF INTEREST		HUMAN			VEHICLE		
Max Lens	FOV	Detect*	Recognize	Identify	Detect	Recognize	Identify
119mm	1.7° x 1.25°	7.0km	1.7km	1.1km	9.8km	2.4km	1.5km

\* Detect: 4 HTVL passing through target; Recognize: 16 HTVL; Identify: 26 HTVL

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## 6960 Series Specifications

### 6960 POSITIONING SYSTEM

#### Pan/Tilt

Pan Range: 360° continuous rotation  
Tilt Range: -90° to +90°

#### Pan Speed

Max Speed: 90°/sec  
Preset: 180° movement (start to stop) <3 sec  
Manual: 0.1° to >40°/sec

#### Tilt Speed

Max Speed: 90°/sec  
Preset: 180° movement (start to stop) <3 sec  
Manual: 0.1° to >40°/sec  
Accuracy: <0.1°  
Repeatability: <0.1°

#### Absolute Positioning

Set Position: ±0.1° precision  
Get Position: ±0.1° precision

#### Presets

64 preset positions (each preset includes pan, tilt, and 24-character ID label)

#### Video Tours

8 tours, each consisting of 32 presets with dwell time per preset per tour

#### Sector Zones

Up to 16 programmable zones in the horizontal plane

#### Privacy Zones (Video Output 1 only)

8 programmable zones can be set for video blanking

#### Compass Direction (Video Output 1 only)

8 or 16 direction points (i.e. north, NE, east, SE, south, SW, west, and NW) can be displayed. Function can be on/off, 3-sec. time out or permanent

#### Absolute Position (Video Output 1 only)

Displayed in 0-359° AZ and +95° to -95° EL.  
Function can be on/off, 3-sec. time out or permanent

#### Title Generation (Video Output 1 only)

Camera ID: 2 lines of 24 characters  
Preset ID: 1 Line of 24 characters  
Sector Zone: 1 line of 24 characters per zone  
Privacy Zone: 1 line of 24 characters per zone  
Alarm Level: 2 lines of 24 characters  
Compass/Position: 1 line, includes compass direction and absolute position

### SYSTEM I/O SIGNALS

#### Video

Video Output 1: Optical or Thermal Camera  
Video Output 2: Thermal Camera

#### Data

RS422 (4 wire, half duplex)

#### Protocol

Cohu, Pelco D&P

### ELECTRICAL

#### Power Input

230VAC ±10%  
120VAC ±10%  
24VAC ±10%

#### Power Consumption

6960: 36 Watts (Heater Option adds 100 Watts)  
6940: +20 Watts (with camera heater on)  
6950: +20 Watts  
6990: +12 to 50 Watts (model-dependent)

### ENVIRONMENTAL

#### Protection Rating

IP66/NEMA-4X/ASTM-B117

#### Operating Temperature

-29.2°F to 122°F (-34°C to 50°C)

#### Humidity

0-100% NC

#### Certifications

Safety: CE (24 VAC model only);  
Emissions: FCC class A

#### Vibration

Conforms to NEMA TS2, para. 2.1.9

#### Shock

Conforms to NEMA TS2, para. 2.1.10

### MECHANICAL

#### Weight

Approx. 35 lbs (15.9 Kg) model-dependent

#### Dimensions

Approx. 5"H x 20"W x 24"D (127mm x 508mm x 609mm)

#### Construction

Powder coated aluminum. External parts corrosion protected with stainless steel fasteners. Internal screws / fasteners nylon or thread locked

#### Field Connector

One PT06E-14-18P(SR) 18-Pin MS environmental connector located on bottom of unit  
- Pigtail mating connector included

#### Mounting

Standard 4.75° BC (PEDD) or 7.00° BC Base Plate (LPED)

## 6940 OPTICAL DAY/NIGHT CAMERA HEAD

### CAMERA

#### Image Sensor

1/4" Sony Ex-View HAD™

#### Total Pixels

NTSC: 811 x 508

PAL: 795 x 596

#### Resolution

Typical 540 HTVL; 400 VTVL

#### Day/Night Method

Removable IR cut filter

#### Sensitivity (F1.4 @ 50IRE, Progressive Scan Mode)

0.1 fc (1.0 lx) @ 1/60 shutter (color mode)

0.01 fc (0.10 lx) @ 1/4 shutter (color mode)

0.005 fc (0.05 lx) @ 1/2 shutter (color mode)

0.001 fc (0.01 lx) @ 1/4 shutter (mono mode)

#### Video Output

1.0 V p-p @ 75 ohms, Progressive Scan

#### Integration Settings

1/30, 1/15, 1/8, 1/4, 1/2 fields per second

#### Shutter Speed Settings

1/60, 1/120, 1/180, 1/250, 1/500, 1/1000,

1/2000, 1/4000, 1/10,000, 1/30,000

#### Wide Dynamic Range

Two shutter speeds in alternative video fields combined into one progressive scan frame

#### Electronic Image Stabilization

5hz Mode: 16db suppression @ 3-13hz

16hz Mode: 16db suppression @ 7-17hz

#### Sync

Crystal

### OPTICAL LENS

#### Integrated Zoom

35X optical zoom

#### Focal Range

3.4mm to 119mm (±15%);

#### Aperture

f1.4 to f4.2

#### AFOV

56° to 1.7° (±15%)

#### Lens Focus

Auto/manual

#### Digital Zoom

Up to 12X. Effective focal length from 3.4mm to 1428mm (±15%)

### OPERATIONAL CONTROL

#### Day/Night Mode

Auto, Color or Monochrome

#### Zoom

Zoom In/Out

#### Lens Speed

Fast or slow mode

#### Lens Focus

Auto/manual selectable

#### Digital Zoom

Selectable digital zoom depth (OFF, 2x, 5x, 10x, 12x)

#### Electronic Image Stabilization

On/Off; 5hz/16hz selectable

#### Wide Dynamic Range

On/Off selectable

#### White Balance

Auto, Manual (Blue/Red), Indoor, Outdoor Modes

#### Shutter/Integration

Auto/manual selectable

#### Video Modes

Live/Freeze; Selectable

#### Freeze Video between Presets

On/Off

### MECHANICAL

#### Construction

Powder coated aluminum

#### Pressure Valve

Schrader Valve

#### Pressurization

5 psi with dry nitrogen

#### Relief Valve

Opens @ >5 psi

### ENVIRONMENTAL

#### Protection Rating

IP67/NEMA- 4X/ASTM-B117

#### Operating Temperature

-29.2° to 165°F (-34° to 74°C)

#### Humidity

Up to 100% relative humidity

#### Vibration

Conforms to NEMA TS2, para. 2.1.9

#### Shock

Conforms to NEMA TS2, para. 2.1.10

#### EMI

FCC rules, Part 15, Subpart J

## 6990 ILLUMINATOR HEAD

### ILLUMINATION

#### Method

Special LED array

#### Wavelength

850nm

#### Spread

10, 30, 60 degrees (model-dependent)

#### Distance

30, 100, 200 meters (model-dependent)

#### Power

12 to 50 watts (model-dependent)

### MECHANICAL

#### Construction

Powder Coated extruded Aluminum

### ENVIRONMENTAL

#### Operating Temperature

- 29.2 °F to 122°F (-34°C to 50°C)

#### Protection Rating

IP65/IP66

## 6950 THERMAL LWIR CAMERA HEAD

*Export license required.*

### DETECTOR

#### Type

Uncooled micro-bolometer

#### Array Format Options

NTSC: 320 x 240; PAL: 384 x 288

NTSC: 640 x 480; PAL: 640 x 480

#### Pixel Size / Fill Factor

320 x 240: 35 x 35µm / 80%

640 x 480: 25 x 25µm / 70%

#### Spectral Range

8 - 14µm

#### Dynamic Range

>1000:1 typical

#### Operability

> 99.9%

#### FPA Operating Temperature

30°C

#### NEdT (camera level)

< 60 mK (w/f1.0 optic)

## Video Format Options

NTSC or PAL (model-dependent)

## FPA Rate

60 fields/sec NTSC  
50 fields/sec PAL

## LENS

### Options

13mm, 25mm, 50mm, 75mm, 100mm options

### Type

Hard Carbon coated Germanium

### Focus

Motorized, Remote Manual Control

## THERMAL CONTROL FUNCTIONS

### Focus

Manual Control of Near / Far

### One-Point Refresh Calibration Modes

Auto on startup  
Auto w/ 2°C internal temp change  
Auto timer – Adjustable from 60-240 minutes  
Manual (User selectable one-time refresh)

### Image Refresh Period

<2 second image freeze

### Color Palette

Five (5) palette selections: (Mono, Low Boost, Red Hot, Sepia, Fusion)

### Digital Zoom

320x240 Detector; Off/ 2x  
640x480 Detector; Off/ 2x / 4x

### Image Freeze

On/Off

### Image Polarity

Normal/Inverted

### Color Bar

On/Off

## MECHANICAL

### Construction

Powder coated aluminum

### Pressure Valve

Schrader Valve

### Pressurization

5 psi with dry nitrogen

### Relief Valve

Opens @ >5 psi



## ENVIRONMENTAL

### Protection Rating

IP66/NEMA- 4X /ASTM- B117

### Operating Temperature

-29.2°F to 122°F (-34°C to 50°C)

### Humidity

0-100% NC

## Certifications

Emissions: FCC class A

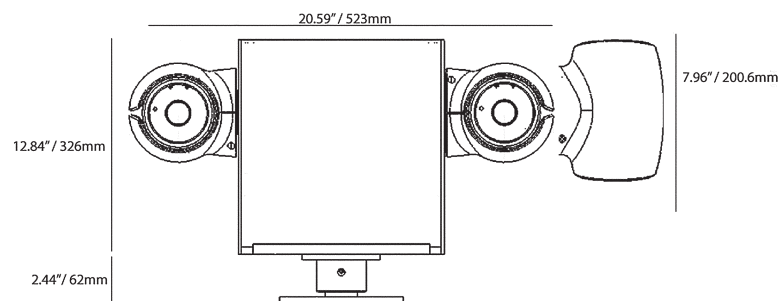
## Vibration

Conforms to NEMA TS2, para. 2.1.9

## Shock

Conforms to NEMA TS2, para. 2.1.10

## DIMENSIONS in inches (mm)



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### ORDERING INFORMATION

#### How to Order

A 6960 Series system is ordered as three line items:

- 1) Specify your 6960 Pan/Tilt Positioner;
- 2) Select Type of Right Head, and Specify Configuration
- 3) Select Type of Left Head, and Specify Configuration
- 4) Example Model Configuration:

6965-6410; 6940-X0X0; 6950-XX00

#### 6960 Pan/Tilt Positioner **696X-XXX0/XXXX**

##### Power

- 3 - 230 VAC
- 4 - 24 VAC
- 5 - 115 VAC

##### Right Head

- 0 - None
- 4 - 6940 Series Optical Day/Night Camera
- 6 - 6950 Series LWIR Thermal Camera

##### Left Head

- 0 - None
- 4 - 6940 Series Optical Day/Night Camera
- 6 - 6990 Series 850 nm IR Illuminator

##### Accessories

- 0 - None
- 1 - P/T heater (120/230 VAC only)

##### Mount Options

- PEDD** - Standard pedestal
- LPED** - Large pedestal
- WALL** - Wall bracket
- POLE** - Pole bracket
- CONR** - Corner bracket
- PARP** - Parapet brackets

#### 6940 Series Configurator **6940-X0X0**

Day/Night Camera Head

##### Camera Options

- 5 - NTSC 35x Day/Night
- 8 - PAL 35x Day/Night

##### Housing Options

- 0 - None
- 1 - Wiper System

#### 6950 Series Configurator **6950-XX00**

Thermal Camera Head

##### Sensor

- 3 - 320 x 240 35µm NTSC
- 4 - 384 x 288 35µm PAL
- 6 - 640 x 480 25µm NTSC
- 7 - 640 x 480 25µm PAL

##### Lens Options

- 3 - 13mm F1.0, Hard Carbon Coated
- 5 - 25mm F1.0, Hard Carbon Coated
- 6 - 50mm F1.0, Hard Carbon Coated
- 7 - 75mm F1.0, Hard Carbon Coated
- 8 - 100mm F1.0, Hard Carbon Coated

#### 6990 Series Configurator **699X-0000**

IR Illuminator

##### IR Illuminator Array

- 1 - 30° / 30m 12W 850nm
- 2 - 60° / 30m 20W 850nm
- 3 - 30° / 50m 20W 850nm
- 4 - 60° / 50m 30W 850nm
- 5 - 30° / 100m 30W 850nm
- 6 - 60° / 100m 38 W 850nm
- 7 - 10° / 200m 42W 850nm
- 8 - 30° / 200m 50W 850nm

Cohu reserves the right to change specifications without notice.  
Trademark names are used for reference only.