

# Hybrid Thermal Network Bullet Camera

400 x 300 Thermal Sensor and a 2 MP CMOS Sensor



## System Overview

The Hybrid Thermal Network camera combines an uncooled VOx 400 x 300 thermal imager with a 2 MP visible-light sensor for cost-effective, long-range surveillance in a rugged all-in-one package. The thermal imager coupled with an athermalized, focus-free lens produces crisp images in total darkness and sees through rain, fog, and snow. The visible imager with an IR illuminator delivers superior video in any lighting condition. Hybrid thermal cameras let you see the visible and the invisible.

## Functions

### Uncooled Vanadium Oxide (VOx) Technology

Dahua thermal cameras use an uncooled Vanadium Oxide (VOx) sensor that delivers higher thermal sensitivity in a more compact and cost-effective package. Vanadium Oxide cameras are also more reliable, as compared to other thermal imaging technologies, due to less moving parts.

### Athermalized Lens

The athermalized lens used in Dahua thermal cameras maintains the focus position passively and without power over a wide temperature range.

### High Thermal Sensitivity

The VOx detector offers high thermal sensitivity ( $\leq 40$  mK) that allows Dahua thermal cameras to distinguish objects in a scene with minimal temperature differences. The camera captures detailed images where thermal contrast between object and background is minimal.

### Smart Alarm

The camera is equipped with a white-light illuminator and an external speaker that can be triggered when the camera detects an abnormal event either via the thermal or the visible-light sensor. The camera also takes a snapshot of the scene and can record the snapshot.

### Thermal Camera

- 400 x 300 VOx Uncooled Thermal Sensor Technology
- Athermalized Lens, Focus-free
- 13 mm Fixed Thermal Lens
- $\leq 40$  mK Thermal Sensitivity

### Visible-light Camera

- 1/2.8-in. 2 MP Progressive-scan CMOS Sensor
- 8 mm Fixed Lens
- Maximum IR Distance 50 m (164.04 ft)

### System Features

- Intelligent Video System with Excessive Temperature Detection
- Enhanced Power and Data Transmission Distances (ePoE)
- Built-in Speaker and White-light Illuminator for Active Deterrence
- IP67 Ingress Protection
- Five-year Warranty\*

### Excessive Temperature Detection and Alarm

With built-in excessive temperature functionality, the camera can detect a rapid rise in temperature over a short time and issue an alarm for a potential event even at long distances. Because thermal cameras are sensitive to temperature, they provide higher temperature detection accuracy than standard cameras, making them particularly fit for applications such as forests, warehouses, and industrial complexes.

### Enhanced Power over Ethernet (ePoE) Technology

Dahua's innovative ePoE technology offers a plug-and-play solution to transmit power and data over long distances via Ethernet or coaxial cables, reducing installation time and saving money. ePoE technology is a viable, cost-effective solution for extending transmission distances and for converting existing, coax-based analog systems into IP systems. For video security and surveillance installers, ePoE technology saves time and money by reducing overall cabling requirements, allowing for existing coax cable to be used, and minimizing the number of peripheral devices needed. For new installations, ePoE offers the ability to design long-distance applications without the need for additional repeaters.

### Cybersecurity

Dahua network cameras are equipped with a series of key cybersecurity technologies including: security authentication and authorization, access control, trusted protection, encrypted transmission, and encrypted storage. These technologies improve the camera's ability to prevent malicious access and to protect data.

### Environmental

With a temperature range of  $-40$  °C to  $+70$  °C ( $-40$  °F to  $+158$  °F), the camera is designed for extreme temperature environments. The camera complies with the IP67 rating makes it suitable for demanding outdoor applications.

### Protection

The camera allows for  $\pm 15\%$  input voltage tolerance, suitable for the most unstable conditions for outdoor applications. Its 6 KV lightning rating provides effective protection for both the camera and its structure against lightning

### Technical Specification

#### Thermal Camera

Image Sensor	Uncooled VOx Microbolometer Plane Detector
Effective Pixels	400 (H) x 300 (V)
Pixel Size	17 μm
Thermal Sensitivity (NETD)	≤ 40 mK (f/1.0)
Spectral Range	8 μm to 14 μm
Color Palettes	18, including: Whitehot, Blackhot, Icefire, Fusion, Rainbow, Globow, Ironbow1, and Sepia

#### Thermal Lens

Lens Type	Fixed, F1.0
Focus Control	Athermalized, Focus-free
Focal Length	13 mm
Angle of View	Horizontal: 30° Vertical: 22.6°

#### DORI Distance<sup>1</sup>

Effective Distance, human (1.80 m x 0.50 m) <sup>1</sup>	Detection	382 m (1253.28 ft)
	Recognition	98 m (321.52 ft)
	Identification	49 m (160.76 ft)
Effective Distance, vehicle (2.30 m x 2.30 m) <sup>1</sup>	Detection	1020 m (3346.47 ft)
	Recognition	225 m (738.19 ft)
	Identification	127 m (416.67 ft)

#### Visible-light Camera

Image Sensor	1/2.8-in. CMOS
Effective Pixels	1920 (H) x 1080 (V)
Horizontal Definition	≥1100 TVL
Electronic Shutter Speed	1/1 s to 1/30,000 s
Minimum Illumination	Color: 0.01 lux at F1.9 B/W: 0.001 lux at F1.9 0 lux with IR On
S/N Ratio	> 55 dB
IR Distance	50.0 m (164.04 ft)
IR On/Off Control	Auto, Manual
IR Angle	45°
IR LEDs	One (1)

#### Visible-light Lens

Focal Length	8 mm
Maximum Aperture	F1.9
Angle of View	Horizontal: 38.4° Vertical: 22.2°
Iris Control	Fixed

### Video

Compression	H.265, H.264, H.264H, H.264B, MJPEG	
Frame Rate	Main Stream	
	Thermal	1280 x 1024, 1280 x 960 (default), 1280 x 720, 400 x 300 at 30 fps
	Visible	1920 x 1080 (default), 1280 x 720, 704 x 576 at 30 fps
	Sub Stream	
	Thermal	640 x 512, 640 x 480, 400 x 300 at 30 fps
	Visible	704 x 576, 352 x 240 at 30 fps
Bit Rate Control	CBR, VBR	
Bit Rate	H.265	Visible Light Sensor: 256 Kbps to 5632 Kbps
		Thermal Sensor: 129 Kbps to 3840 Kbps
	H.264	Visible Light Sensor: 256 Kbps to 8192 Kbps
		Thermal Sensor: 216 Kbps to 6144 Kbps
Day/Night	Auto (ICR), Color, B/W	
BLC Mode	BLC, HLC, WDR	
White Balance	Auto, Manual, Indoor, Outdoor, ATW, Street Lamp, Natural	
Noise Reduction	2D NR, 3D NR	
Motion Detection	Off, On (4 Zones, Rectangular)	
Advanced Features	Defog, Exposure Compensation	
Flip	0°, 90°, 180°, 270°	
Mirror	Off, On	
Privacy Masking	Four (4) Areas	

### Network

Ethernet	RJ-45 (10/100 Base-T)
Protocol	HTTP, HTTPS, TCP, ARP, RTSP, RTP, UDP, RTCP, SMTP, FTP, DHCP, DNS, DDNS, PPPOE, IPv4/v6, SNMP, QoS, UPnP, NTP, Multicast, SFTP, 802.1x
Interoperability	CGI
Streaming Method	Unicast / Multicast
Maximum User Access	Up to 20 Users (total bandwidth: 64 Mbps)
Edge Storage	FTP Micro SD Card Slot, maximum 64 GB
Web Viewer	IE8 and later
Management Software	DSS, DMSS
Mobile Operating System	iOS, Android
User Management	Up to 20 users, supports multi-level user permissions (2 levels): management group and user group
Malfunction Detection	Network disconnection detection, IP conflict detection, memory card state detection, memory space detection
Cybersecurity	Video Encryption, Firmware Encryption, Configuration Encryption, Digest, WSSE, Account Lockout, Security Logs, IP/MAC Filtering, Generating and Importing X.509 Certification, Syslog, HTTPS, 802.1x, Trusted Boot, Trusted Execution, Trusted Upgrade

### Audio

Compression	G.711a, G.711Mu, PCM
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1. The DORI distance is a measure of the general proximity for a specific classification to help pinpoint the right camera for your needs. The DORI distance is calculated based on sensor specifications and lab test results according to EN 62676-4, the standard that defines the criteria for the Detect, Observe, Recognize and Identify classifications. The Detection, Recognition, and Identification values shown are nominal values and should be used as estimates only. Exact value calculations depend on a wide variety of conditions.

Certifications

Safety	UL 60950-1, CAN/CSA C22.2 No. 60950-1-07 EN 62368-1:2014+A11:2017
Electromagnetic Compatibility (EMC)	CFR 47 FCC Part 15 subpart B ANSI C63.4-2014 EN 55032:2015+A11:2020, Class B EN IEC 61000-3-2:2019, EN 61000-3-3:2013+A1:2019, EN 55024:2010+A1:2015, EN 55035:2017+A11:2020, EN 50130-4:2011+A1:2014

Interface

Video	One (1) CVBS Port, BNC
Audio	Input: One (1) Channel, 3.5 mm Jack Output: One (1) Channel, 3.5 mm Jack
RS485	One (1) Port
Alarm	Input: Two (2) Channels Output: Two (2) Channels

Electrical

Power Supply	12 VDC ± 20%, PoE (IEEE802.3af Class 0), or ePoE
Power Consumption	Basic: < 8 W Maximum: < 18 W

Environmental

Operating Condition	-40° C to +70° C (-40° F to +158° F) Less than 95% RH
Storage Conditions	-40° C to +70° C (-40° F to +158° F) Less than 95% RH
Ingress Protection	IP67

Construction

Casing	Metal
Dimensions (L x W x H)	280.0 mm x 103.50 mm x 95.80 mm (11.02 in. x 4.07 in. x 3.77 in.)
Net Weight	1.80 kg (3.97 lb)
Gross Weight	2.50 kg (5.51 lb)

Intelligence

IVS triggers an alarm and takes a defined action for the following events:

Standard Features	<ul style="list-style-type: none"> <li>Tampering with the camera.</li> <li>Camera loses or changes focus drastically.</li> <li>Error writing to an onboard Micro SD card.</li> <li>Error sending or receiving data over the network.</li> <li>Unauthorized access to the camera.</li> </ul>
Premium Features	
Tripwire	A target crosses a user-defined line.
Intrusion	A target enters or exits a defined perimeter.
Advanced Features	
Excessive Temperature Detection	Detects a rapid rise in temperature over a short time and issues an alarm.
Smoking Detection	Detects a person smoking in the thermal image and triggers a pre-determined action (voice prompt, white light) to alert the person of the smoking policy.
Human/Vehicle Classification	Detects human or vehicle violations using Tripwire or Intrusion detection methods.

Effective IVS Distances – Thermal Lens

	13 mm
Human (1.80 m x 0.50 m)	91.0 m (298.56 ft)
Vehicle (4.0 m x 1.40 m)	273.0 m (895.67 ft)

Via CAT5E/CAT6 Ethernet Cable

ePoE supply voltage 48 V  
Maximum DC resistance < 10 Ω/100 m

Cable Length, m (ft)	Bandwidth, Mbps	PoE Load Capacity, W	Hi-PoE Load Capacity, W	Working Mode
100 (328)	100	25.5	53	IEEE/E100
200 (656)	100	25.5	33	E100
300 (984)	100	19	19	E100
400 (1312)	10	17	17	E10
500 (1640)	10	13	13	E10
800 (2625)	10	7	7	E10

Via CAT5E/CAT6 Ethernet Cable

ePoE supply voltage 53 V  
Maximum DC resistance < 10 Ω/100 m

Cable Length, m (ft)	Bandwidth, Mbps	PoE Load Capacity, W	Hi-PoE Load Capacity, W	Working Mode
100 (328)	100	25.5	53	IEEE/E100
200 (656)	100	25.5	47	E100
300 (984)	100	25.5	32	E100
400 (1312)	10	23	26	E10
500 (1640)	10	20	20	E10
800 (2625)	10	13	13	E10

Via RG-59 Coaxial Cable

ePoE supply voltage 48 V  
Maximum DC resistance < 5 Ω/100 m

Cable Length, m (ft)	Bandwidth, Mbps	PoE Load Capacity, W	Hi-PoE Load Capacity, W	Working Mode
100 (328)	100	25.5	50	IEEE/E100
200 (656)	100	25.5	30	E100
300 (984)	100	18	18	E100
400 (1312)	100	15	15	E100
500 (1640)	10	12	12	E10
800 (2625)	10	6	6	E10
1000 (3281)	10	5	5	E10

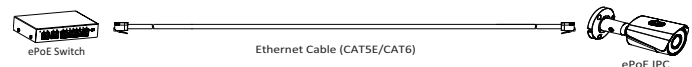
Via RG-59 Coaxial Cable

ePoE supply voltage 53 V  
Maximum DC resistance < 5 Ω/100 m

Cable Length, m (ft)	Bandwidth, Mbps	PoE Load Capacity, W	Hi-PoE Load Capacity, W	Working Mode
100 (328)	100	25.5	52	IEEE/E100
200 (656)	100	25.5	48	E100
300 (984)	100	25.5	30	E100
400 (1312)	100	20	23	E100
500 (1640)	10	16	16	E10
800 (2625)	10	10	10	E10
1000 (3281)	10	8	8	E10

ePoE Applications

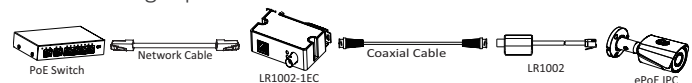
Pure Ethernet



Passive EoC



EoC with Single-port EoC Receiver



**Ordering Information**

Type	Part Number	Description
Hybrid Network Camera	DH-TPC-BF5421	Hybrid Network Bullet Camera, Thermal: 400 x 300, 13 mm lens, Visible-light: 2 MP, 8 mm lens, IVS
Mounting Accessories, optional	PFA121	Junction Box
	PFA150	Pole Mount
	PFA151	Corner Mount
	PFA152-E	Pole Mount
	DH-PFM321D-US	12 VDC, 1 A Power Adapter
ePoE Accessories, optional	LR1002	EoC Passive Converter
	LR1002-1EC	Single-port EoC Receiver

**Accessories**

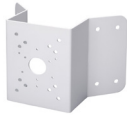
Optional:



PFA121  
Junction Box



PFA150  
Pole Mount



PFA151  
Corner Mount



PFA152-E  
Pole Mount



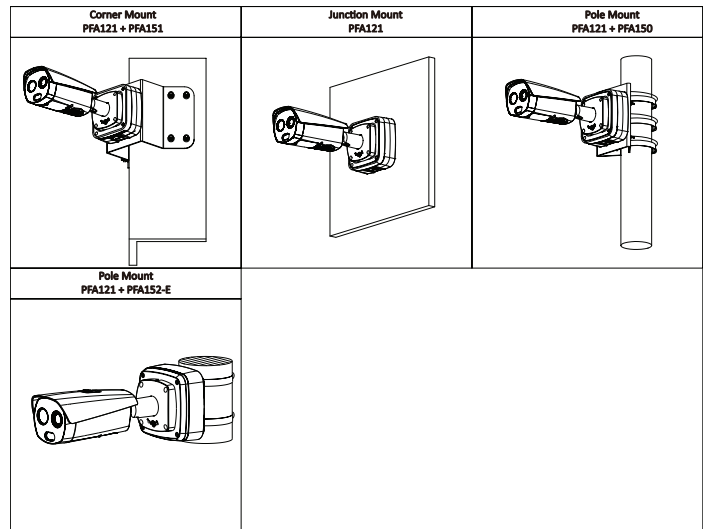
LR1002  
EoC Passive Converter



LR1002-1EC  
Single-port EoC  
Receiver



DH-PFM321D-US  
12 VDC, 1 A  
Power Adapter



**Dimensions(mm/in.)**

