Dahua TECHNOLOGY

Hybrid Thermal Network Bullet Camera
256 x 192 Thermal Sensor and a 2 MP CMOS Sensor

Thermal Camera
- 256 x 192 VOx Uncooled Thermal Sensor Technology
- Athermalized Lens, Focus-free
- 3.5 mm or 7.0 m Fixed Thermal Lens
- ≤ 50 mK Thermal Sensitivity

Visible-light Camera
- 1/2.8-in. 2 MP CMOS Sensor
- 4 mm or 8 mm Fixed Lens
- Maximum IR Distance 35 m (114 ft)

System Features
- Designed for Remote Temperature Measurement (not suitable for human temperature monitoring)
- Enhanced Power and Data Transmission Distances (ePoE)
- IP67 Ingress Protection

Lite Series	50mK	Fire Detection	Analysis	DC12V	IP67

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

Temperature Monitoring
The thermal camera provides remote temperature monitoring that has the ability to trigger an alarm for a temperature that exceeds a set threshold. This feature is ideal for industrial applications where it is dangerous for humans and where maintaining a consistent temperature is vital.

Intelligent Video System (IVS)
IVS is a built-in video analytic algorithm that delivers intelligent functions to monitor a scene for Tripwire violations, intrusion detection, and abandoned or missing objects. A camera with IVS quickly and accurately responds to monitoring events in a specific area.

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.

Environmental
With a temperature range of −30 °C to +60 °C (−22 °F to +140 °F), the camera is designed for extreme temperature environments. The camera complies with the IP67 rating making it suitable for demanding outdoor applications.

System Overview
The Hybrid Thermal Network camera combines an uncooled VOx 256 x 192 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. The built-in Fire Detection feature identifies a rapid temperature rise and warns of a potential fire. 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 (≤ 50 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.

Active 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.

Onvif

Technical Specification

Thermal Camera

Image Sensor	Uncooled VOx Microbolometer
Effective Pixels	256 (H) x 192 (V)
Pixel Size	12 µm
Thermal Sensitivity (NETD)	≤ 50 mK at f1.0
Spectral Range	8 µm to 14 µm
Image Setting	Brightness, Sharpness, ROI, AGC, FFC, 3D DNR
Color Palettes	18, including: Whitehot, Blackhot, Icefire, Fusion, Rainbow, Globow, Ironbow1, and Sepia

Thermal Lens

		DH-TPC-BF2221N-TB3F4	DH-TPC-BF2221N-TB7F8
Lens Type		Fixed	
Focus Control		Athermalized, Focus-free	
Focal Length		3.5 mm	7.0 mm
Angle of View		Horizontal: 50.6° Vertical: 37.8°	Horizontal: 24° Vertical: 18°
Effective Distance, human (1.80 m x 0.50 m)[1]	Detection	146 m (479 ft)	292 m (958 ft)
	Recognition	38 m (125 ft)	75 m (246 ft)
	Identification	19 m (62 ft)	38 m (125 ft)
Effective Distance, vehicle (2.30 m x 2.30 m)[1]	Detection	389 m (1276 ft)	778 m (2552 ft)
	Recognition	97 m (318 ft)	194 m (636 ft)
	Identification	49 m (161 ft)	97 m (318 ft)

Visible-light Camera

Image Sensor		1/2.8-in. CMOS
Effective Pixels		1920 (H) x 1080 (V)
Electronic Shutter Speed		1/1 s to 1/100,000 s
Minimum Illumination		Color: 0.005 lux B/W: 0.0005 lux 0 lux with IR On
S/N Ratio		> 65 dB
IR Distance	4 mm Lens	35.0 m (114.83 ft)
	8 mm Lens	50.0 m (164.04 ft)
IR On/Off Control		Auto, Manual
IR LEDs		One (1)

Visible-light Lens

	DH-TPC-BF2221N-TB3F4	DH-TPC-BF2221N-TB7F8
Focal Length	4 mm	8 mm
Maximum Aperture	F2.0	F1.9
Angle of View	Horizontal: 84° Vertical: 45° Diagonal: 99°	Horizontal: 40° Vertical: 22° Diagonal: 46°
Focus Control	Fixed	
Close Focus Distance	0.20 m (31.50 ft)	

Temperature Measurement

Range	Low	−20° C to 150° C (−4° F to 302° F)
	High	0° C to 550° C (32° F to 1022° F)
Accuracy		±0.5° C (0.9° F), when operating temperature is between −10° C to 50° C (14° F to 122° F)
Mode		Spot, Line, Area
Rule		Supports 12 Rules Simultaneously: • Spot: 12 • Line: 12 • Area: 12

	DH-TPC-BF2221N-TB3F4	DH-TPC-BF2221N-TB7F8
Temperature Measurement Distance		
Recommended Distance (Target Size: 0.1 m x 0.1 m)	2.50 m (8.20 ft)	5.80 m (19.03 ft)
Maximum Distance (Target Size: 0.3 m x 0.3 m)	8.80 m (28.7 ft)	17.50 m (57.41 ft)
Fire Detection Distance		
Recommended Distance (Target Size: 0.2 m x 0.2 m)	13.20 m (43.31 ft)	30.70 m (100.72 ft)
Maximum Distance (Target Size: 0.2 m x 0.3 m)	26.30 m (86.29 ft)	61.40 m (201.44 ft)

Video

Compression		H.265, H.264, H.264H, H.264B, MJPEG
Frame Rate	Main Stream	
	Thermal	1280 x 960, 1024 x 768, 640 x 480, 256 x 192 at 30 fps
	Visible	1920 x 1080, 1280 x 720 at 30 fps
	Sub Stream	
	Thermal	640 x 480, 256 x 192 at 30 fps
	Visible	704 x 480, 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, Digital WDR
White Balance		Auto, Indoor, Outdoor, ATW, Manual, Sodium lamp, Natural, Street Light
Noise Reduction		2D, 3D
Motion Detection		Off, On (4 zones, Rectangle)
Region of Interest		Off, On (4 zones)
Defog		On, Off, Auto
Flip		90°, 180°, 270°
Mirror		Off, On
Privacy Masking		Off, On (4 areas, Rectangle)

1. 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.

Network

Ethernet	RJ-45 (10/100 Base-T)
Protocol	HTTP; TCP; ARP; RTSP; RTP; UDP; RTCP; SMTP; FTP; DHCP; DNS; DDNS; PPPOE; IPv4/v6; SNMP; QoS; UPnP; NTP
Interoperability	ONVIF Profile S & G, API
Streaming Method	Unicast, Multicast
Maximum User Access	20 Users
Edge Storage	Network Attached Storage (NAS) Micro SD Card Slot, maximum 128 GB
Web Viewer	IE 11
Management Software	DSS, DMSS
Mobile Operating System	Android, IOS

Audio

Compression	G.711a, G.711Mu, AAC, PCM

Certifications

Safety	UL 60950-1, 2nd Edition CAN/CSA C22.2 No. 60950-1-07, 2nd Edition EN 60950-1:2006 + A11:2009 + A1:2010 + A12:2011 + A2:2013 IEC 60950-1:2005 (Second Edition); Am1:2009 + Am2:2013
Electromagnetic Compatibility (EMC)	CFR 47 FCC Part 15 Subpart B EN 55032:2015, Class B; IEC 61000-3-2:2019; EN 61000-3-2: 2014; EN 61000-3-3: 2013 + A1: 2019; EN 55035: 2017; EN 55024: 2010 + A1: 2015; EN 50130-4: 2011 + A1: 2014

Interface

Video	One (1) HDCVI Port, 1.0 Vp-p/75 Ω (Thermal Imager only)
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 (IEEE 802.3af), ePoE
Power Consumption	Basic	5 W
	Maximum	12 W

Environmental

Operating Temperature	−30° C to +60° C (−22° F to +140° F) Less than 95% RH Initiate startup above −30° (−22° F)
Storage Temperature	−40° C to +70° C (−40° F to +158° F) Less than 95% RH
Ingress Protection	IP67
Surge Protection	Surge: 6 KV Electrostatic (touch): 8 KV Electrostatic (air): 15 KV

Construction

Casing	Metal
Dimensions	279.90 mm x 103.80 mm x 95.80 mm (11.02 in. x 4.09 in. x 3.77 in.)
Net Weight	1.40 kg (3.09 lb)
Gross Weight	1.90 kg (4.19 lb)

Intelligence

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

Standard Features	• Tampering with the camera. • Camera loses or changes focus drastically. • Error writing to an onboard Micro SD card. • Error sending or receiving data over the network. • Unauthorized access to the camera.

Premium Features

Tripwire	A target crosses a user-defined line.
Intrusion	A target enters or exits a defined perimeter.
Abandoned/Missing Object	A target leaves an object in designated area, or a target removes an object from the same designated area.

Advanced Features

Rapid Tempertature Rise	Detects a rapid rise in temperature over a short time and issues an alarm for a potential fire.
Cold/Hot Spot Trace	Indicates the coldest and the hottest spot of the scene.
Human/Vehicle Classification	Detects human or vehicle violations using Tripwire or Intrusion detection methods.
Temperature Monitoring	Detects a temperature that exceeds a set threshold (temperature range: −20° C to +450° C [−4° F to 842° F])

ePoE Transmission Distances

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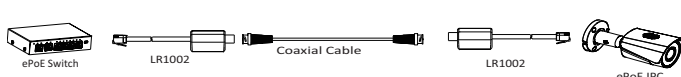ePoE supply voltage 53 V
Maximum DC resistance < 5 Ω/100 m

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

ePoE Switch   Ethernet Cable (CAT5E/CAT6)   ePoE IPC

Passive EoC

ePoE Switch   LR1002   Coaxial Cable   LR1002   ePoE IPC

EoC with Single-port EoC Receiver

PoE Switch   Network Cable   LR1002-1EC   Coaxial Cable   LR1002   ePoE IPC
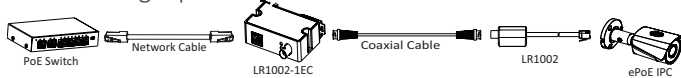
Ordering Information

Type	Part Number	Description
Hybrid Network Camera	DH-TPC-BF2221N-TB3F4	Hybrid Network Bullet Camera, Thermal: 256 x 192, 3.5 mm lens, Visible-light: 2 MP, 4 mm lens, IVS
	DH-TPC-BF2221N-TB7F8	Hybrid Network Bullet Camera, Thermal: 256 x 192, 7.0 mm lens, Visible-light: 2 MP, 8 mm lens, IVS
Mounting Accessories, optional	DH-PFB120C	Ceiling Mount Bracket
	PFA121	Junction Box
	DH-PFB129W	Wall/Ceiling Mount Bracket
	PFA151	Corner Mount
	PFA152-E	Pole Mount
	DH-PFM320D-US	12 VDC, 2 A Power Adapter
	DH-PFM321D-US	12 VDC, 1 A Power Adapter
ePoE Accessories, optional	LR1002	EoC Passive Converter
	LR1002-1EC	Single-port EoC Receiver

Accessories

Optional :

DH-PFB120C
Ceiling Mount
Bracket

PFA121
Junction Box

DH-PFB129W
Wall/Ceiling Mount
Bracket

PFA151
Corner Mount

PFA152-E
Pole Mount

DH-PFM320D-US
12 VDC, 2 A
Power Adapter

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

LR1002
EoC Passive
Converter

LR1002-1EC
Single-port EoC
Receiver

Junction Mount	Pole Mount
PFA121	PFA121 + PFA152-E

Dimensions(mm/in.)

103.8 [4.09"]

95.8 [3.77"]

279.9 [11.02"]

181.5 [7.14"]

70.0 [2.76"]

4 x 4.5 [0.18"]

70.0 [2.76"]