al:hua TECHNOLOGY

Human Body Temperature Measurement
Complete Solution to Detect and Monitor Human Body Temperature

Required Components

- DH-TPC-BF3221-T Thermal Hybrid Network Camera
- JQ-D70Z Blackbody
- DHI-NVR5216-16P-I 16-channel NVR with Face Recognition

Recommended Accessories

- VCT-999 Tripod (x2)
- RQW026-00 Connector (x2)

Solution Features

- Safe, Effective, and Accurate Temperature Measurement
- ±0.3° C Temperature Measurement (with blackbody)
- Contactless and Fast Multi-person Screening
- Recommended for Use in Commercial Buildings, Healthcare Facilities, Airports, Metro Stations, and Public Gathering Locations

Solution Overview

The Dahua Human Body Temperature Monitoring solution offers the latest hybrid thermal network camera that combines a Vanadium Oxide (VOx) sensor with a 2 MP visible-light sensor. The solution also provides a blackbody calibration device that maintains a constant temperature as a reference point for the thermal camera. The thermal camera coupled with the blackbody calibration device and a feature-rich 4 TB Network Video Recorder delivers a contactless solution for continuous, contactless, and non-invasive temperature monitoring.

Human Body Temperature Measuring technology assists in preventing the spread of viral diseases by allowing for quick, accurate detection of elevated body temperatures. Thermal imaging equipment can easily be installed and implemented to detect elevated body temperature in environments such as airports, hospitals, clinics, office buildings, cruise ships, and any large public gathering location.

Thermal Camera 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.

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.

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.

NVR Functions

The Dahua DHI-NVR5216-16P-I combines Analytics+ algorithms with Dahua's ePoE technology into an all-in-one network video recorder. This NVR uses a powerful multi-core processor to provide 4K resolution processing for applications where impeccable image details are required. In addition, the NVR can be employed as edge storage, central storage, or backup storage with an intuitive shortcut operation menu for remote management and control.

The Dahua Analytics+ algorithms significantly improve accuracy and reliability, as compared to standard intelligent features, to achieve precision human facial analysis. The NVR processes 24 facial images per second on up to four (4) channels of video stream face recognition and supports 20 face databases that can store up to 100,000 total face images. The Analytics+ facial recognition extracts facial metadata, including detecting a human wearing a mask. The system can identify certain facial attributes, including when a human wears a surgical-type face mask. Wearing of such a mask still allows for temperature measurement without interference.

Real-time Face Recognition
Analytics+ performs real-time facial recognition on up to four (4) streaming video channels simultaneously. The server captures and analyzes facial features to determine gender, age, expression, glasses, moustache, and mask, and then can record the faces and store the associated structured data. The server also filters incoming video to display faces that match target features.

Face Database Management
In addition to the 100,000 facial images, the NVR database also stores names, genders, birthdays, nationality, address, and ID information associated with each facial image. The NVR also offers powerful and configurable database management features that can be applied to each face recognition channel independently.

Technical Specification

DH-TPC-BF3221-T Thermal Hybrid Camera

Thermal Camera

Image Sensor	Uncooled VOx Microbolometer
Effective Pixels	256 (H) x 192 (V)
Pixel Size	12 μm
Thermal Sensitivity (NETD)	≤ 50 mK at f/1.1
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

Lens Type	Fixed
Focus Control	Athermalized, Focus-free
Focal Length	7.1 mm
Angle of View	Horizontal: 24° Vertical: 18°

Visible-light Camera

Image Sensor	1/2.8-in. CMOS
Effective Pixels	1920 (H) x 1080 (V)
Electronic Shutter Speed	1/1 s to 1/30,000 s
Minimum Illumination	Color: 0.002 lux at F1.9 B/W: 0.0002 lux at F1.9 0 lux with IR On
IR Distance	35.0 m (114.83 ft)
IR On/Off Control	Auto, Manual
IR LEDs	One (1)

Visible-light Lens

Focal Length	8 mm
Maximum Aperture	F1.9
Angle of View	Horizontal: 40° Vertical: 22°

Temperature Measurement

Range	30° C to 45° C (86° F to 113° F)
Accuracy	±0.3° C, with blackbody ±1° C, without blackbody
Mode	Spot, Line, Area
Rule	Supports 12 Rules Simultaneously: • Spot: 12 • Line: 12 • Area: 12

Video

Compression		H.265, H.264, MJPEG
Frame Rate	Main Stream	
	Thermal	1280 x 1024, 1024 x 768, 640 x 480, 256 x 192 at 30 fps
	Visible	1920 x 1080, 1280 x 720, 704 x 480 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.264: 640 Kbps to 8192 Kbps
Day/Night		Auto (ICR), Color, B/W
BLC Mode		BLC, HLC, WDR
White Balance		Auto, Manual
Motion Detection		Off, On (4 zones, Rectangle)
Region of Interest		Off, On (4 zones)
Defog		On, Off
Flip		180°
Mirror		Off, On
Privacy Masking		Off, On (4 areas, Rectangle)

Network

Ethernet	RJ-45 (10/100 Base-T)
Protocol	IPv4/IPv6, HTTP, HTTPS, 802.1x, Qos, FTP, SMTP, UPnP, SNMP, DNS, DDNS, NTP, RTSP, RTP, TCP, UDP, IGMP, ICMP, DHCP, PPPoE, ONVIF
Interoperability	ONVIF Profile S & G, API
Streaming Method	Unicast, Multicast
Maximum User Access	20 Users

Certifications

Safety	EN 60950:2000
Electromagnetic Compatibility (EMC)	FCC CFR 47 Part 15 Subpart B

Interface

Audio	Input: One (1) Channel, 3.5 mm Jack Output: One (1) Channel, 3.5 mm Jack
Audio Compression	G.711a, G.711Mu, AAC, PCM
RS485	One (1) Port
Alarm	Input: Two (2) Channels Output: Two (2) Channels

Technical Specification - Thermal Hybrid Camera, cont.

Electrical

Power Supply	12 VDC or PoE (IEEE802.3af Class 0)
Power Consumption	Maximum 12 W

Environmental

Operating Temperature	10° C to +35° C (50° F to +95° F)
Storage Conditions	10° C to +35° C (50° F to +95° F) Less than 95% RH
Ingress Protection	IP67

Construction

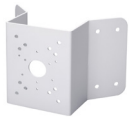|	
Casing	Metal
Dimensions	279.90 mm x 103.80 mm x 95.80 mm (11.02 in. x 4.09 in. x 3.77 in.)
Net Weight	1.40 kg (3.09 lb)

Ordering Information

Type	Part Number	Description
Hybrid Network Camera	DH-TPC-BF3221-T	Hybrid Network Bullet Camera, Thermal: 256 x 192, 7.1 mm lens, Visible-light: 2 MP, 8 mm lens
Mounting Accessories, optional	PFA121	Junction Box
	PFA151	Corner Mount
	PFA152-E	Pole Mount
	DH-PFM321D-US	12 VDC, 1 A Power Adapter

Accessories

Optional :

PFA121
Junction Box

PFA151
Corner Mount

PFA152-E
Pole Mount

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

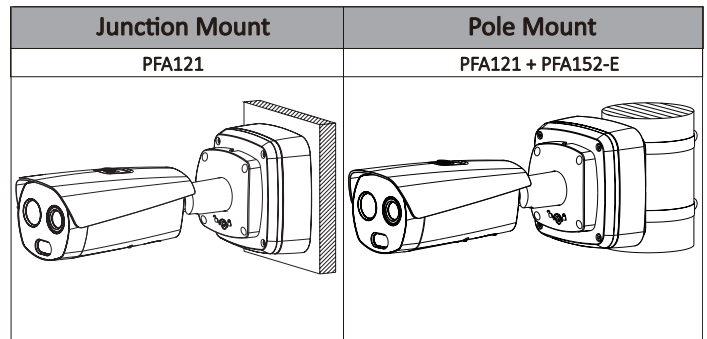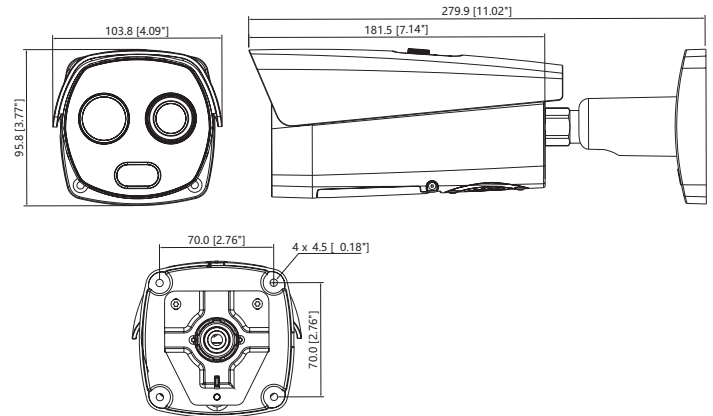| Junction Mount	Pole Mount
PFA121	PFA121 + PFA152-E

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"]

Technical Specification

DHI-NVR5216-16P-I 16-channel NVR

System

Main Processor	Multi-core Embedded Processor
Operating System	Embedded LINUX

Analytics+ Perimeter Protection

Performance	• 16 channels • 10 Tripwire/Intrusion rules per channel
Object Classification	• Human or Vehicle • Secondary Recognition for Tripwire and Intrusion
Search	• Search by object classification (human or vehicle)

Analytics+ Face Recognition

Performance	• Process 24 facial images per second • Up to four (4) channels of video stream face recognition • 16 channel picture stream face recognition (with face detection camera)
Stranger Mode	• Detects a face not stored in the database. • Similarity Threshold set manually.
Search by Image	• Up to eight (8) target face image searches simultaneously. • Supports Similarity Threshold for each target face image.
Database Management	• 20 Face Databases • 100,000 total face images • Stores name, gender, birthday, nationality, address, ID information for each face picture.
Database Application	Each database can be applied to video channels independently.
Trigger Events	Buzzer, Voice Prompts, Email, Snapshot, Recording, Alarm Out, PTZ Activation

Analytics+ Metadata Extraction

Face	Gender, age, wearing glasses, beard, wearing mask
Vehicle	Color, model, logo, plate color, decorations, driver on phone, driver wearing seatbelt
Human Body	Clothing style and color, wearing hat, carrying bag
Non-motor Vehicle	Type, color, number of people
Search	Search video for target using metadata tags

Audio and Video

IP Camera Input	16 Channels
Audio	Input: One (1) Channel, RCA Output: (1) Channel, RCA

Display

Interface	One (1) HDMI Output One (1) VGA Output
Native Output Resolution (HDMI and VGA)	3840 x 2160, 1920 x 1080, 1280 x 1024, 1280 x 720 1024 x 768
Maximum Decoding	Four (4) Channels of 8 MP at 30 fps 16 Channels of 1080p at 30 fps
Multi-screen Display	1, 4, 8, 9, 16

Recording

Compression	Smart H.265+, H.265, Smart H.264+, H.264, MJPEG
Supported IP Camera Resolution	16 MP, 12 MP, 8 MP, 6 MP, 5 MP, 4 MP, 3 MP, 1080p, 1.3 MP, 720p, D1, CIF
Maximum Incoming Bandwidth	320 Mbps (160 Mbps when Analytics+ functions enabled)
Record Mode	Manual, Schedule (Continuous, Motion Detection, Alarm, IVS)
Record Interval	1 to 120 minutes (default: 60 minutes) Pre-record: 1 to 30 s Post-record: 10 to 300 s

Video Detection and Alarm

Trigger Events	Alarm Out, Video Push, Email, Recording, PTZ, Tour, Snapshot, Voice Prompt, Buzzer and Screen Tips
Video Detection	Motion Detection, MD Zones: 396 (22 × 18); Video Loss, Tampering, and Scene Change
Alarm Inputs	Four (4) Channels
Relay Outputs	Two (2) Channels

Playback and Backup

Sync Playback	1, 4, 9, 16
Search Mode	Time and Date, Alarm, Motion Detection, and Exact Search (accurate to one second)
Playback Function	
Backup Mode	USB Device, Network

Third-party Support

Third-party Support	Arecont Vision, Airlive, AXIS, Canon, Dynacolor, JVC, LG, Panasonic, Pelco, Xunmei, Samsung, Sanyo, Sony, Watchnet, plus more

Network

Interface	One (1) RJ-45 Port (10/100/1000 Mbps)
PoE	16 PoE Ports (IEEE802.3af/at)
ePoE and EoC	Ports 1 through 8
Network Function	HTTP, HTTPS, TCP/IP, IPv4/IPv6, UPnP, SNMP, RTSP, UDP, SMTP, NTP, DHCP, DNS, IP Filter, PPPoE,DDNS, FTP, Alarm Center, IP Search (Support Dahua IP camera, DVR, NVS, etc.), P2P
Maximum User Access	128 Users
Mobile Operating Systems	IOS, Android
Interoperability	ONVIF 2.4, SDK, CGI

Storage

Internal HDD	Two (2) SATA III Ports, up to 8 TB capacity for each HDD

Auxiliary Interface

USB	One (1) USB 3.0 Port, rear One (1) USB 2.0 Port, front
RS232	One (1) Port for PC Communication and Keyboard
RS485	One (1) Port for PTZ Control

Thermal Solution

Technical Specification - 16-channel NVR, cont.

Electrical

Power Supply	Single, 100 VAC to 240 VAC, 50/60 Hz
Power Consumption, NVR	< 16.5 W, without HDD
PoE Budget	• 130 W Total Rated Power (80% control for protection) • Maximum 25.5 W for a single port

Environmental

Operating Conditions	−10° C to +55° C (14° F to 131° F), 86 kpa to 106 kpa
Storage Conditions	−20° C to +70° C (−4° F to 158° F), 0% to 90% RH

Construction

Dimensions	
NVR	1U, 375.0 mm x 327.18 mm x 53.80 mm (14.76 in. x 12.88 in. x 2.12 in.)
NVR with PFH101 Rack Mount Tray	482.60 mm x 327.18 mm x 53.80 mm (19.0 in. x 12.88 in. x 2.12 in.)
Net Weight	2.70 kg (5.95 lb), without HDD
Gross Weight	4.00 kg (8.82 lb), without HDD
Installation	Standard 19-in. Rack-mount

Certifications

Safety	UL 60950-1 EN60950-1
Electromagnetic Compatibility (EMC)	FCC CFR 47 Part 15 Subpart B ANSI C63.4-2014 EN55032, EN55024, EN50130-4

ePoE/EOC 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

Thermal Solution

Technical Specification - 16-channel NVR, cont.

Ordering Information

Type	Part Number	Description
4K NVR with Analytics+	DHI-NVR5216-16P-I 4TB	16-channel 1U ePoE 4K, H.265 Network Video Recorder with Analytics+, 4 TB
Accessories, optional	PFH101	Rack Mount Tray 482.60 mm x 281.20 mm x 43.7 mm (19.0 in. x 11.07 in. x 1.72 in.)
ePoE Accessories	LR1002	EoC Passive Converter
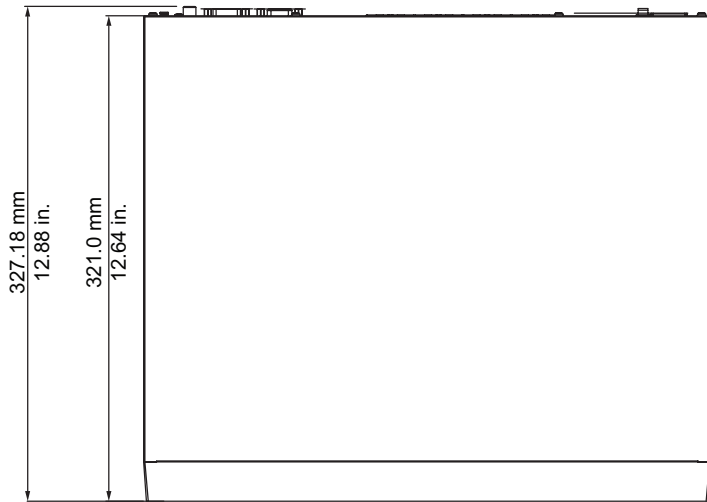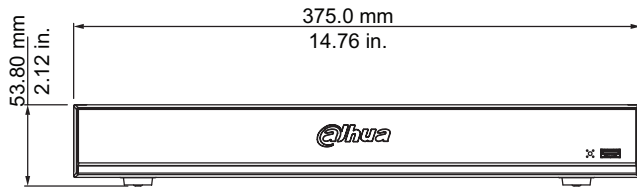
Rear Panel
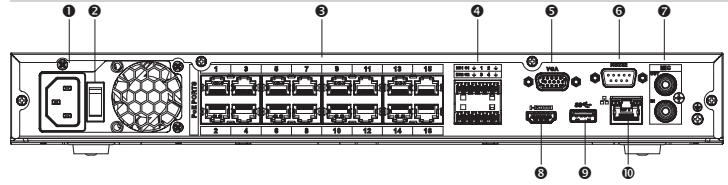
1	Power Input	6	RS232 Port
2	Power Switch	7	Audio Input (x1 RCA) Audio Output (x1 RCA)
3	PoE/PoE+ Ports (x16 RJ-45) ePoE/EoC Ports: 1 through 8	8	HDMI Output
4	Alarm Input (x2) Alarm Output (x2) RS485	9	USB 3.0 Port
5	VGA Output	10	RJ-45 Ethernet Port (1000 Mbps)

Thermal Solution

Technical Specification

JQ-D70Z Human Temperature Measurement Blackbody

Working Temperature	Factory Settings: 35.0° C (95.0° F), 37° C (98.6° F), 40.0° C (104.0° F) Environmental Temperature: +5° C to 50° C (41° F to 122° F)
Effective Radiant Surface	70 mm x 70 mm (
Temperature Resolution	0.1° C
Temperature Accuracy	±0.2° C (single point)
Temperature Stability	±0.1° C to 0.2° C / 30 minutes
Effective Emissivity	0.97
Temperature Sensor	Pt100
Power Supply	110 VAC to 220 VAC
Power Consumption	35 W
Net Weight	1.80 kg (3.97 lb)
Dimensions (W x H x D)	110.0 mm x 120.0 mm x 180.0 mm (4.33 in. x 4.72 in. x 7.09 in.)
Ambient Operating Conditions	0° C to 40° C (32° F to 104° F) ≤ 80% RH

Accessory	Description
VCT-999	Tripod Two (2) required: • One (1) for thermal camera • One (1) for blackbody
RQW026-00	Connector Two (2) required: • One (1) to connect thermal camera to tripod • One (1) to connect Blackbody to tripod

Installation Recomendations

For Thermal Camera and Blackbody

Lens Focal Length	Distance Between Camera and Blackbody	Distance Between the Human Forehead and the Camera	Channel Width
7.0. mm	3.0 m (118.11 in)	3.0 m (118.11 in.)	1.30 m (51.18 in.)

Note: The accuracy of temperature measurement is best when the human forehead and blackbody are at the same distance from the camera.