

# AXIS Q1686-DLE Radar-Video Fusion Camera

Monitor traffic and identify hazardous vehicles 24/7

AXIS Q1686-DLE uses a 60 GHz radar to monitor vehicle speeds up to 200 km/h (125 mph), 24/7. It can accurately track speed and direction with a minimum false alarm rate. Featuring a varifocal tele lens with 46°–9° horizontal FoV and traffic-optimized IR illumination kit, it can reliably identify an offending vehicle, 24/7. Built on an open platform, you can use AXIS Q1686-DLE with license plate recognition software to connect the speed and direction to a specific license plate. This enables reliable identification of a vehicle, on the edge – in the camera itself. Furthermore, it offers easy installation and configuration.

- > Merge vehicle speed and license plate – on the edge
- > Radar tracking of speed and direction
- > Monitor speeds up to 200 km/h (125 mph)
- > Reliable license plate capture and recognition 24/7
- > Open platform for third-party software



# AXIS Q1686-DLE Radar-Video Fusion Camera

## Camera

### Image sensor

1/1.8" progressive scan RGB CMOS  
Pixel size 2.9 µm

### Lens

Varifocal, 9–50 mm, F1.5  
Horizontal field of view: 46°–9°  
Vertical field of view: 26°–5°  
Minimum focus distance: 3 m (9.8 ft)  
Autofocus, i-CS lens, IR corrected, remote zoom and focus, P-Iris control

### Day and night

Automatic IR-cut filter  
Hybrid IR filter

### Minimum illumination

4 MP 25/30 fps with Forensic WDR and Lightfinder 2.0  
Color: 0.05 lux at 50 IRE, F1.5  
B/W: 0.01 lux at 50 IRE, F1.5  
4 MP 50/60 fps with Lightfinder 2.0  
Color: 0.1 lux at 50 IRE, F1.5  
B/W: 0.02 lux at 50 IRE, F1.5  
0 lux with IR illumination on

### Shutter speed

1/47500 s to 1 s

## License Plate Capture

### Detection range

Up to 50 m (164 ft) day and night

### IR illumination

Optimized IR with power-efficient, long-life 850 nm IR LED's with adjustable angle of illumination and intensity. Range of reach 50 m (164 ft) or more depending on the scene.

### Vehicle speed

Up to 200 km/h (125 mph) with optional edge analytics  
More than 200 km/h (125 mph) available with optional server based analytics

## Coverage

Up to two lanes with optional edge or server based analytics  
Supports front and rear license plate capture

## Installation

Center or side mounted  
Mounting height: Up to 12 m (39 ft)  
Lateral distance from road: Up to 7 m (23 ft)<sup>1</sup>  
Camera detects tilt and roll angle automatically  
Built-in traffic camera installation assistant optimizes video settings based on mounting height, distance to vehicle, and expected vehicle speed

## Radar

### Profiles

Road monitoring  
Area monitoring

### Sensor

FMCW (Frequency Modulated Continuous Wave)

### Object data

Object type (classes: humans, vehicles, unknown), range, direction, velocity

### Frequency

61.0–61.5 GHz<sup>2</sup>

### RF transmit power

<100 mW (EIRP)  
License-free. Unharmful radio waves.

### Recommended mounting height

3.5–12 m (11–39 ft)<sup>1</sup>

### Recommended mounting tilt

Up to 18°<sup>1</sup>

### Detection range

Road monitoring profile: Up to 150 m (492 ft) when detecting a vehicle<sup>3</sup>  
Area monitoring profile: 5–60 m (16–200 ft) when detecting a person<sup>4</sup>  
5–90 m (16–300 ft) when detecting a vehicle<sup>4</sup>

1. See the user manual at [axis.com](http://axis.com) for mounting recommendations

2. For road monitoring, center frequency is 61.340 GHz for channel 1 and 61.140 GHz for channel 2.

3. Measured at 7 m mounting height, with 15° tilt. The mounting height, tilt and placement of the radar-video fusion camera affects the detection range. See the user manual at [axis.com](http://axis.com) for more information.

4. Measured at 5 m mounting height, with 25° tilt. See user manual at [axis.com](http://axis.com) for more information.

## Radial speed

Road monitoring profile: Up to 200 km/h (125 mph)

Area monitoring profile: Up to 55 km/h (34 mph)

## Field of detection

Horizontal: 95°

## Speed accuracy

+/- 2 km/h (1.25 mph)

Fulfills all requirements in section 7.3 of OIML

R91:1990<sup>5</sup>

## Distance accuracy

Road monitoring profile: 0.8 m (2.6 ft)

Area monitoring profile: 0.5 m (1.6 ft)

## Angle accuracy

1°

## Spatial differentiation

3 m<sup>6</sup>

## Data refresh rate

10 Hz

## Coverage

Road monitoring profile: See the product's user manual at [axis.com](http://axis.com)<sup>7</sup>

Area monitoring profile: 2700 m<sup>2</sup> (29000 sq ft) for persons

6100 m<sup>2</sup> (65600 sq ft) for vehicles

## Coexistence zone

Frequency band: 60 GHz

Radius: 350 m (1148 ft)

Recommended number of radars: up to 8

## Radar controls

Multiple detection zones, line crossing detection with one or two lines, exclude zones with filters for short-lived objects, object speed, and object type, configurable trigger duration

Radar transmission on/off, grid opacity, zone opacity, color scheme, trail lifetime, detection sensitivity, swaying object filter, small object filter, frequency channel, reference map calibration with options to scale, pan, and zoom map

## System on chip (SoC)

### Model

ARTPEC-8

### Memory

2048 MB RAM, 8192 MB Flash

### Compute capabilities

Deep learning processing unit (DLPU)

## Video

### Video compression

H.264 (MPEG-4 Part 10/AVC) Baseline, Main and High Profiles

H.265 (MPEG-H Part 2/HEVC) Main Profile

Motion JPEG

### Resolution

16:9: 2688x1512 to 160x90

16:10: 1280x800 to 160x100

4:3: 2016x1512 to 160x120

### Frame rate

WDR: Up to 25/30 fps (50/60 Hz) in all resolutions

No WDR: Up to 50/60 fps (50/60 Hz) in all resolutions

### Video streaming

Up to 20 unique and configurable video streams<sup>8</sup>

Axis Zipstream technology in H.264 and H.265

Controllable frame rate and bandwidth

VBR/ABR/MBR H.264/H.265

Low latency mode

Video streaming indicator

### Signal-to-noise ratio

>55 dB

### WDR

Forensic WDR: Up to 120 dB depending on scene

### Noise reduction

Spatial filter (2D noise reduction)

Temporal filter (3D noise reduction)

5. For access to METAS test report No. 258-44378, contact your sales representative.

6. Minimum distance between moving objects.

7. The radar coverage for road monitoring depends on factors like the mounting height of the device and speed of vehicles. For more information, see the user manual.

8. We recommend a maximum of 3 unique video streams per camera or channel, for optimized user experience, network bandwidth, and storage utilization. A unique video stream can be served to many video clients in the network using multicast or unicast transport method via built-in stream reuse functionality.

## Image settings

Saturation, contrast, brightness, sharpness, white balance, day/night threshold, local contrast, tone mapping, exposure mode, exposure zones, defogging, compression, dynamic text and image overlay, polygon privacy mask, target aperture  
Scene profiles: forensic, vivid, traffic overview, license plate

## Image processing

Axis Zipstream, Forensic WDR, Lightfinder 2.0, OptimizedIR

## Audio

### Audio features

Automatic gain control  
Speaker pairing

### Audio streaming

Two-way (full duplex)  
Noise reduction

### Audio input

10-band graphic equalizer  
Input for external balanced or unbalanced microphone, optional 5 V microphone power  
Digital input, optional 12 V ring power  
Balanced or unbalanced line input  
Input through speaker pairing

### Audio output

Line output  
Output through speaker pairing

### Audio encoding

24bit LPCM, AAC-LC 8/16/32/48 kHz, G.711 PCM 8 kHz, G.726 ADPCM 8 kHz, Opus 8/16/48 kHz  
Configurable bitrate

## Network

### Network protocols

IPv4, IPv6, USGv6, ICMPv4/ICMPv6, HTTP, HTTPS<sup>9</sup>, HTTP/2, TLS<sup>9</sup>, QoS Layer 3 DiffServ, FTP, SFTP, CIFS/SMB, SMTP, mDNS (Bonjour), UPnP<sup>®</sup>, SNMP v1/v2c/v3 (MIB-II), DNS/DNSv6, DDNS, NTP, PTP, NTS, RTSP, RTP, SRTP/RTSPS, TCP, UDP, IGMPv1/v2/v3, RTCP, ICMP, DHCPv4/v6, ARP, SSH, LLDP, CDP, MQTT v3.1.1, Secure syslog (RFC 3164/5424, UDP/TCP/TLS), Link-Local address (ZeroConf), IEEE 802.1X (EAP-TLS), IEEE 802.1AR

## System integration

### Application Programming Interface

Open API for software integration, including VAPIX<sup>®</sup>, metadata and AXIS Camera Application Platform (ACAP); specifications at [axis.com/developer-community](https://axis.com/developer-community).

One-click cloud connection

ONVIF<sup>®</sup> Profile G, ONVIF<sup>®</sup> Profile M, ONVIF<sup>®</sup> Profile S, and ONVIF<sup>®</sup> Profile T, specifications at [onvif.org](https://onvif.org)

### Video management systems

Compatible with AXIS Camera Station Edge, AXIS Camera Station Pro, AXIS Camera Station 5, and video management software from Axis' partners available at [axis.com/vms](https://axis.com/vms).

### Onscreen controls

Privacy masks  
Radar picture-in-picture  
Augmented overlay (radar)  
Media clip

### Edge-to-edge

Speaker pairing  
PTZ camera pairing

### Event conditions

Application  
Audio: audio clip playing  
Device status: above/below/within operating temperature, casing open, IP address blocked, IP address removed, new IP address, live stream active, network lost, ring power overcurrent protection, system ready, radar data failure: interference, no data, tampering  
Digital audio input status  
Edge storage: recording ongoing, storage disruption, storage health issues detected  
I/O: digital input, manual trigger, virtual input  
MQTT: subscribe  
Radar motion  
Scheduled and recurring: schedule  
Video: average bitrate degradation, day-night mode, tampering

<sup>9</sup> This product includes software developed by the OpenSSL Project for use in the OpenSSL Toolkit. ([openssl.org](https://openssl.org)), and cryptographic software written by Eric Young ([eay@cryptsoft.com](mailto:eay@cryptsoft.com)).

## Event actions

Audio clips: play, stop  
Day-night mode  
Defog mode  
I/O: toggle I/O once, toggle I/O while the rule is active  
LEDs: flash status LED  
MQTT: publish  
Notifications: HTTP, HTTPS, TCP and email  
Overlay text  
Radar: radar autotracking, radar detection  
Recordings: SD card and network share  
SNMP traps: send, send while the rule is active  
Upload of images or video clips: FTP, SFTP, HTTP, HTTPS, network share and email  
WDR mode

## Built-in installation aids

Traffic camera installation assistant, pixel counter, remote zoom and focus, level grid, leveling assistant

## Analytics

### Applications

#### Included

AXIS Object Analytics, AXIS Scene Metadata, AXIS Image Health Analytics, AXIS Video Motion Detection, AXIS Speed Monitor<sup>10</sup>, AXIS Radar Integration for Microbus<sup>10</sup>, active tampering alarm, audio detection, orientation aid

#### Supported

AXIS License Plate Verifier,  
Support for AXIS Camera Application Platform enabling installation of third-party applications, see [axis.com/acap](https://axis.com/acap)

### AXIS Object Analytics

**Object classes:** humans, vehicles (types: cars, buses, trucks, bikes, other)

**Scenarios:** line crossing, object in area, time in area, crossline counting, occupancy in area  
Up to 10 scenarios

**Key features:** detection sensitivity, object speed

**Other features:** triggered objects visualized with trajectories, color-coded bounding boxes and tables  
Polygon include/exclude areas  
Perspective configuration  
ONVIF Motion Alarm event

### AXIS Image Health Analytics

#### Detection settings:

Tampering: blocked image, redirected image  
Image degradation: blurred image, underexposed image  
**Other features:** sensitivity, validation period

## AXIS Scene Metadata

**Object classes:** humans, faces, vehicles (types: cars, buses, trucks, bikes), license plates  
**Object attributes:** vehicle color, upper/lower clothing color, confidence, position, speed, distance, direction, longitude and latitude, license plate information<sup>11</sup>

## Approvals

### Product markings

CSA, UL/cUL, CE, RCM

### Supply chain

TAA compliant

### EMC

CISPR 24, CISPR 35, EN 55035, EN 55032 Class A, EN 50121-4, EN 61000-3-2, EN 61000-3-3, EN 61000-6-1, EN 61000-6-2  
**Australia/New Zealand:** RCM AS/NZS CISPR 32 Class A  
**Canada:** ICES-3(B)/NMB-3(B)  
**USA:** FCC Part 15 Subpart B Class B

### Safety

CAN/CSA C22.2 No. 62368-1 ed. 3,  
IEC/EN/UL 62368-1 ed. 3, IEC/EN 62471 risk group 2, IS 13252

### Environment

IEC 60068-2-1, IEC 60068-2-2, IEC 60068-2-6, IEC 60068-2-14, IEC 60068-2-27, IEC 60068-2-78, IEC/EN 60529 IP66, IEC/EN 62262 IK10, NEMA 250 Type 4X, NEMA TS 2 (2.2.7-2.2.9), ISO 21207 (Method B)

### Wireless

EN 305550, EN 301489-1, EN 301489-3, EN 62311, FCC Part 15 Subpart C

### Network

NIST SP500-267

### Cybersecurity

ETSI EN 303 645, EN18031-3

<sup>10</sup>. Available for download

<sup>11</sup>. Only available with AXIS License Plate Verifier

## Cybersecurity

### Edge security

**Software:** Signed OS, brute force delay protection, digest authentication and OAuth 2.0 RFC6749 Client Credential Flow/OpenID Authorization Code Flow for centralized ADFS account management, password protection

**Hardware:** Axis Edge Vault cybersecurity platform TPM 2.0 (CC EAL4+, FIPS 140-2 Level 2), secure element (CC EAL 6+), system-on-chip security (TEE), Axis device ID, secure keystore, signed video, secure boot, encrypted filesystem (AES-XTS-Plain64 256bit)

### Network security

IEEE 802.1X (EAP-TLS, PEAP-MSCHAPv2)<sup>12</sup>, IEEE 802.1AE (MACsec PSK/EAP-TLS), IEEE 802.1AR, HTTPS/HSTS<sup>12</sup>, TLS v1.2/v1.3<sup>12</sup>, Network Time Security (NTS), X.509 Certificate PKI, host-based firewall

### Documentation

*AXIS OS Hardening Guide*

*Axis Vulnerability Management Policy*

*Axis Security Development Model*

AXIS OS Software Bill of Material (SBOM)

To download documents, go to [axis.com/support/cybersecurity/resources](https://axis.com/support/cybersecurity/resources)

To read more about Axis cybersecurity support, go to [axis.com/cybersecurity](https://axis.com/cybersecurity)

## General

### Casing

IP66-, NEMA 4X- and IK10-rated

Aluminum casing, weathershield (ASA) with black anti-glare coating

Color: white NCS S 1002-B

For repainting instructions, go to the product's support page. For information about the impact on warranty, go to [axis.com/warranty-implication-when-repainting](https://axis.com/warranty-implication-when-repainting).

This product can be repainted.

### Power

Power over Ethernet (PoE) IEEE 802.3at Type 2 Class 4

Typical 10 W, max 25.5 W

10–28 V DC, typical 9.5 W, max 25.5 W

### Connectors

Network: RJ45 10BASE-T/100BASE-TX/1000BASE-T PoE

I/O: Terminal block for two supervised and two unsupervised configurable inputs / digital outputs (12 V DC output, max load 50 mA)

Audio: 3.5 mm mic/line in, 3.5 mm line out

Serial communication: RS485/RS422, 2 pcs, 2 pos, full duplex, terminal block

Power: DC input, terminal block

### IR illumination

Optimized IR with power-efficient, long-life 850 nm IR LEDs

Range of reach 50 m (164 ft) or more depending on the scene

### Storage

Support for microSD/microSDHC/microSDXC card

Support for SD card encryption (AES-XTS-Plain64 256bit)

Recording to network-attached storage (NAS)

For SD card and NAS recommendations see [axis.com](https://axis.com)

### Operating conditions

Temperature: -40 °C to 60 °C (-40 °F to 140 °F)

Start-up temperature: -25 °C (-13 °F)

Maximum temperature according to NEMA TS 2 (2.2.7): 74 °C (165 °F)

Humidity: 10–100% RH (condensing)

Wind speed (sustained): 60 m/s (134 mph)<sup>13</sup>

### Storage conditions

Temperature: -40 °C to 65 °C (-40 °F to 149 °F)

Humidity: 5–95% RH (non-condensing)

### Dimensions

For the overall product dimensions, see the dimension drawing in this datasheet.

Effective Projected Area (EPA): 0.063 m<sup>2</sup> (0.67 ft<sup>2</sup>)

### Weight

5100 g (11.2 lb)

### Box content

Camera, weathershield, AXIS TQ1003-E Wall Mount, installation guide, resistorx® T20 tool, terminal block connectors, connector guard, cable gaskets, owner authentication key

12. This product includes software developed by the OpenSSL Project for use in the OpenSSL Toolkit. ([openssl.org](https://openssl.org)), and cryptographic software written by Eric Young ([ey@cryptsoft.com](mailto:ey@cryptsoft.com)).

13. The values shown are based on results from actual wind tunnel testing. The maximum wind speed when the unit is stationary is not known due to wind speed limit of 60 m/s (135 mph) at the test lab. For drag force calculations, use Effective Projected Area (EPA).

## Optional accessories

AXIS T8415 Wireless Installation Tool

AXIS Surveillance Cards

AXIS Bird Control Spike

AXIS P13 Weathershield Extension A

For more accessories, go to [axis.com/products/axis-q1686-dle#accessories](https://axis.com/products/axis-q1686-dle#accessories)

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## System tools

AXIS Site Designer, AXIS Device Manager, product selector, accessory selector, lens calculator

Available at [axis.com](https://axis.com)

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## Languages

English, German, French, Spanish, Italian, Russian, Simplified Chinese, Japanese, Korean, Portuguese, Polish, Traditional Chinese, Dutch, Czech, Swedish, Finnish, Turkish, Thai, Vietnamese

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## Warranty

5-year warranty, see [axis.com/warranty](https://axis.com/warranty)

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## Part numbers

Available at [axis.com/products/axis-q1686-dle#part-numbers](https://axis.com/products/axis-q1686-dle#part-numbers)

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## Sustainability

### Substance control

PVC free, BFR/CFR free in accordance with JEDEC/ECA Standard JS709

RoHS in accordance with EU RoHS Directive 2011/65/EU and 2015/863, and standard EN IEC 63000:2018

REACH in accordance with (EC) No 1907/2006. For SCIP UUID, see [echa.europa.eu](https://echa.europa.eu)

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### Materials

Renewable carbon-based plastic content: 5% (biobased)

Screened for conflict minerals in accordance with OECD guidelines

To read more about sustainability at Axis, go to [axis.com/about-axis/sustainability](https://axis.com/about-axis/sustainability)

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### Environmental responsibility

[axis.com/environmental-responsibility](https://axis.com/environmental-responsibility)

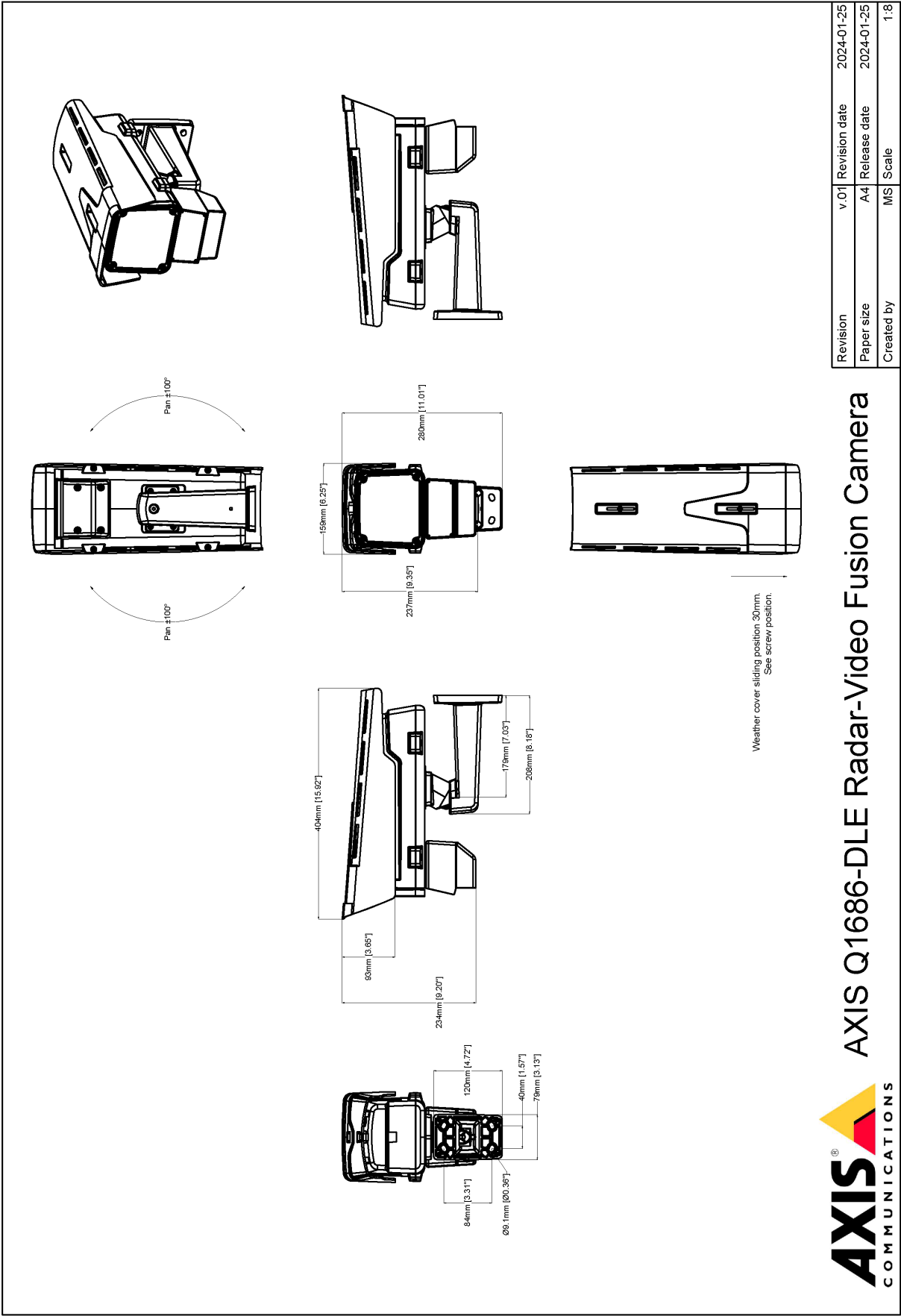
Axis Communications is a signatory of the UN Global Compact, read more at [unglobalcompact.org](https://unglobalcompact.org)

**Detect, Observe, Recognize, Identify (DORI)**

|           | DORI definition     | Distance (wide)    | Distance (tele)     |
|-----------|---------------------|--------------------|---------------------|
| Detect    | 25 px/m (8 px/ft)   | 130.2 m (427.1 ft) | 664.4 m (2179.2 ft) |
| Observe   | 63 px/m (19 px/ft)  | 51.6 m (169.2 ft)  | 263.6 m (864.6 ft)  |
| Recognize | 125 px/m (38 px/ft) | 26 m (85.3 ft)     | 132.9 m (436 ft)    |
| Identify  | 250 px/m (76 px/ft) | 13 m (42.6 ft)     | 66.5 m (218.1 ft)   |

The DORI values are calculated using pixel densities for different use cases as recommended by the EN-62676-4 standard. The calculations use the center of the image as the reference point and consider lens distortion. The possibility to recognize or identify a person or object depends on factors such as object motion, video compression, lighting conditions, and camera focus. Use margins when planning. The pixel density varies across the image, and the calculated values can differ from the distances in the real world.

Dimension drawing



## Highlighted capabilities

### Axis Edge Vault

Axis Edge Vault is the hardware-based cybersecurity platform that safeguards the Axis device. It forms the foundation that all secure operations depend on and offer features to protect the device's identity, safeguard its integrity and protect sensitive information from unauthorized access. For instance, **secure boot** ensures that a device can boot only with **signed OS**, which prevents physical supply chain tampering. With signed OS, the device is also able to validate new device software before accepting to install it. And the **secure keystore** is the critical building-block for protecting cryptographic information used for secure communication (IEEE 802.1X, HTTPS, Axis device ID, access control keys etc.) against malicious extraction in the event of a security breach. The secure keystore and secure connections are provided through a Common Criteria or FIPS 140 certified hardware-based cryptographic computing module.

Furthermore, signed video ensures that video evidence can be verified as untampered. Each camera uses its unique video signing key, which is securely stored in the secure keystore, to add a signature into the video stream allowing video to be traced back to the Axis camera from where it originated.

To read more about Axis Edge Vault, go to [axis.com/solutions/edge-vault](https://axis.com/solutions/edge-vault).

For more information, see [axis.com/glossary](https://axis.com/glossary)