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

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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	OptimizedIR 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)[a] 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	**Area monitoring profile Channel 1:** 61.25-61.48 GHz **Area monitoring profile Channel 2:** 61.02-61.25 GHz **Road monitoring profile Channel 1:** 61.25-61.43 GHz **Road monitoring profile Channel 2:** 61.05-61.23 GHz
RF transmit power	<100 mW (EIRP) License-free. Unharmful radio waves.
Recommended mounting height	3.5–12 m (11–39 ft)[b]
Recommended mounting tilt	Up to 18°[c]
Detection range	**Road monitoring profile:** Up to 150 m (492 ft) when detecting a vehicle[d] **Area monitoring profile:** 5–60 m (16–200 ft) when detecting a person[e] 5–90 m (16–300 ft) when detecting a vehicle[f]
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[g]
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[h]
Data refresh rate	10 Hz
Coverage	**Road monitoring profile:** See the product's user manual at *axis.com*[i] **Area monitoring profile:** 2700 m^2 (29000 sq ft) for persons 6100 m^2 (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[j] 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)
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[k], HTTP/2, TLS[l], QoS Layer 3 DiffServ, FTP, SFTP, CIFS/SMB, SMTP, mDNS (Bonjour), UPnP®, SNMP v1/v2c/v3 (MIB-II), DNS/DNSv6, DDNS, NTP, 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®, metadata and AXIS Camera Application Platform (ACAP); specifications at *axis.com/developer-community*. One-click cloud connection ONVIF® Profile G, ONVIF® Profile M, ONVIF® Profile S, and ONVIF® Profile T, specifications at *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*.
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
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[m], AXIS Radar Integration for Microbus[n], 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*
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[o]

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

Cybersecurity

Edge security	**Software:** Signed OS, brute force delay protection, digest authentication and OAuth 2.0 RFC6749 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)[p], IEEE 802.1AE (MACsec PSK/EAP-TLS), IEEE 802.1AR, HTTPS/HSTS[q], TLS v1.2/v1.3[r], 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* To read more about Axis cybersecurity support, go to *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*. 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	OptimizedIR 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*
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)

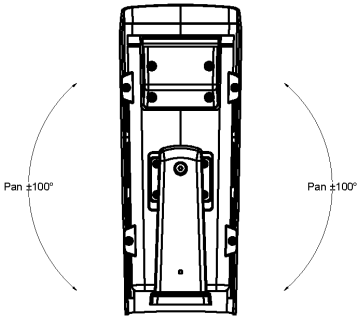
	Humidity: 10–100% RH (condensing) Wind speed (sustained): 60 m/s (134 mph)[s]
Storage conditions	Temperature: -40 °C to 65 °C (-40 °F to 149 °F) Humidity: 5–95% RH (non-condensing)
Dimensions	For the overall product dimensions, see the dimension drawing in this datasheet. Effective Projected Area (EPA): 0.063 m^2 (0.67 ft^2)
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
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*
System tools	AXIS Site Designer, AXIS Device Manager, product selector, accessory selector, lens calculator Available at *axis.com*
Languages	English, German, French, Spanish, Italian, Russian, Simplified Chinese, Japanese, Korean, Portuguese, Polish, Traditional Chinese, Dutch, Czech, Swedish, Finnish, Turkish, Thai, Vietnamese
Warranty	5-year warranty, see *axis.com/warranty*
Part numbers	Available at *axis.com/products/axis-q1686-dle#part-numbers*
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*
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*
Environmental responsibility	*axis.com/environmental-responsibility* Axis Communications is a signatory of the UN Global Compact, read more at *unglobalcompact.org*

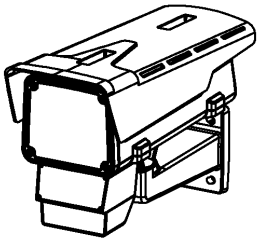
a. *See the user manual at axis.com for mounting recommendations*
b. *See the user manual at axis.com for mounting recommendations*
c. *See the user manual at axis.com for mounting recommendations*
d. *Measured at 7 m mounting height, with 15° tilt. The mounting height, tilt and placement of the radar-video fusion camera affects the detection range. See the user manual at axis.com for more information.*
e. *Measured at 5 m mounting height, with 25° tilt. See user manual at axis.com for more information.*
f. *Measured at 5 m mounting height, with 25° tilt. See user manual at axis.com for more information.*
g. *For access to METAS test report No. 258-44378, contact your sales representative.*
h. *Minimum distance between moving objects.*
i. *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.*
j. *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.*
k. *This product includes software developed by the OpenSSL Project for use in the OpenSSL Toolkit. (openssl.org), and cryptographic software written by Eric Young (eay@cryptsoft.com).*
l. *This product includes software developed by the OpenSSL Project for use in the OpenSSL Toolkit. (openssl.org), and cryptographic software written by Eric Young (eay@cryptsoft.com).*
m. *Available for download*
n. *Available for download*
o. *Only available with AXIS License Plate Verifier*
p. *This product includes software developed by the OpenSSL Project for use in the OpenSSL Toolkit. (openssl.org), and cryptographic software written by Eric Young (eay@cryptsoft.com).*
q. *This product includes software developed by the OpenSSL Project for use in the OpenSSL Toolkit. (openssl.org), and cryptographic software written by Eric Young (eay@cryptsoft.com).*
r. *This product includes software developed by the OpenSSL Project for use in the OpenSSL Toolkit. (openssl.org), and cryptographic software written by Eric Young (eay@cryptsoft.com).*
s. *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).*

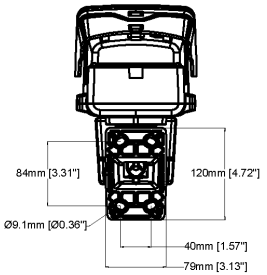
Detect, Observe, Recognize, Identify (DORI)

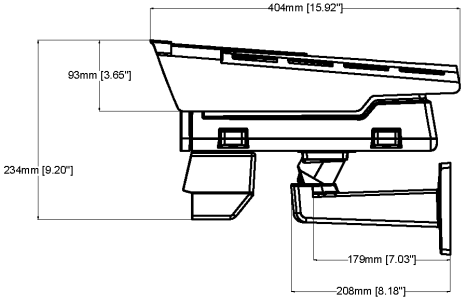
	DORI definition	Distance (wide)	Distance (tele)
Detect	25 px/m (8 px/ft)	130.2 m (427.1 ft)	664.4 m (2179.2 ft)
Observe	63 px/m (19 px/ft)	51.6 m (169.2 ft)	263.6 m (864.6 ft)
Recognize	125 px/m (38 px/ft)	26 m (85.3 ft)	132.9 m (436 ft)
Identify	250 px/m (76 px/ft)	13 m (42.6 ft)	66.5 m (218.1 ft)

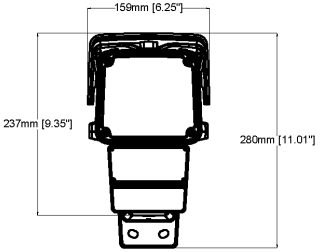
The DORI values are calculated using pixel densities for different use cases as recommended by the EN-62676-4 standard. The calculations use the center of the image as the reference point and consider lens distortion. The possibility to recognize or identify a person or object depends on factors such 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.

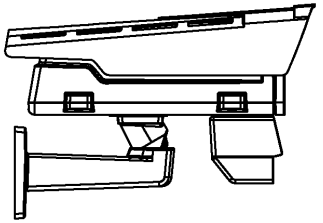


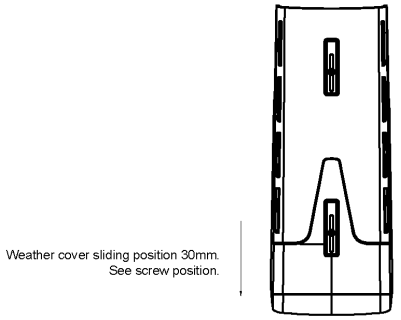












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Revision	v.01	Revision date	2024-01-25
Paper size	A4	Release date	2024-01-25
Created by	MS	Scale	1:8

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T10201732/EN/M10.3/2503

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*.

For more information, see *axis.com/glossary*

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