Hanwha Vision is a global leading supplier of solutions for IP and analog video surveillance. Building on the company's history of innovation, Hanwha Vision is dedicated to providing systems solutions with the highest levels of performance, reliability and cost-effectiveness. Hanwha Vision is committed to the continued development of innovative systems products for professional security applications.

For additional information, visit <https://www.hanwhavision.com/en/>, https://hanwhavisionamerica.com

1. **PRODUCTS**
	1. **EQUIPMENT**
		1. Manufacturer: Hanwha Vision (https://www.hanwhavision.com/en/, https://hanwhavisionamerica.com)
		2. Model: TNM-C4940TDR
		3. Alternates: None
	2. **GENERAL DESCRIPTION**
		1. Thermal VGA camera shall provide thermographic image so user can recognize object with heat even in dark scene. And the camera shall provide 8MP normal image simultaneously with thermographic image.
		2. Video Compression and Transmission – The camera shall have the following properties relating to the video signals it produces.
			1. H.264, H.265 and MJPEG compression, each derived from a dedicated encoder and capable of being streamed independently and simultaneously.
				1. H.265 and H.264

Thermal: Max. 30fps/25fps(60Hz/50Hz), 15fps (Both channel AI on)

Visible: Max. 30fps/25fps(60Hz/50Hz), 15fps (Both channel AI on)

* + - * 1. MJPEG

Thermal: Max. 3fps

Visible: Max. 1fps

* + - 1. The camera shall be able to configure up to 10 independent video stream profiles with differing encoding, quality, frame rate, resolution, and bit rate settings.
			2. The camera shall be able to configure various resolution selections for thermal image.
				1. 16:9 aspect ratio: 1280x720, 800x448, 640x360
				2. 4:3 aspect ratio: 1280x960, 1024x768, 800x600, 640x480
				3. 5:4 aspect ratio: 720x576
				4. 3:2 aspect ratio: 720x480
			3. The camera shall be able to configure various resolution selections for visible image.
				1. 16:9 aspect ratio: 3840x2160, 3072x1728, 2688x1520, 2560x1440, 1920x1080, 1280x720, 800x448, 640x360
				2. 4:3 aspect ratio: 2592x1944, 2048x1536, 1600x1200, 1280x960, 1024x768, 800x600, 640x480
				3. 5:4 aspect ratio: 1280x1024, 720x576
				4. 3:2 aspect ratio: 720x480
			4. The camera shall support unicast video streaming up to 6 users.
			5. The camera shall support multicast video streaming.
			6. The camera shall support multiple video streaming up to 3 profiles.
			7. The camera shall be able to configure Dynamic DNS (DDNS). DDNS shall be provided with no additional cost by the manufacturer.
			8. The camera shall provide WiseStream Ⅱ/Ⅲ, Dynamic GOV and Dynamic FPS to efficiently manage bit rate of the video stream and reduce storage.
			9. The camera shall provide WiseNRⅡ that working based on AI engine for reduce noise and blur on image.
		1. Camera – The camera device shall have the following physical and performance properties:
			1. IK10, NEMA4X rated for protection against impacts.
			2. True day/night operation with scheduling and options for external devices.
				1. Low light level operation to 0.06 lux at F1.3 in color mode, 0.004 lux at F1.3 in black and white mode on visible camera.
				2. Black and white mode operation to 0 lux with IR LED on.
			3. The camera shall be able to produce clear images in highly contrast scenes with multi-exposure wide dynamic range up to 120dB.
			4. The camera shall be able to configure 6 privacy masking areas with rectangle zones.
			5. The camera shall provide video display on smart phone (iPhone, Android) to adjust viewing angle and focus.
		2. Intelligence and Analytics – The camera shall have a suite of intelligent analytic functions.
			1. Visible
				1. Classified object type: Person / Face / Vehicle / License plate
				2. Attributes: Vehicle type (car / bus / truck / motorcycle / bicycle)
				3. Support BestShot
				4. Analytics events based on AI engine: Object detection, Virtual line(Crossing / Direction), Virtual area\*(Loitering / Intrusion / Enter / Exit) \* Some of the video analytics only works with people and vehicle detection
				5. Analytics events: Defocus detection, Motion detection, Tampering, Audio detection, Sound classification, Shock detection, Virtual Area (Appear / Disappear)

Motion detection with 8 definable detection areas with 4 points polygonal zones, and minimum/maximum object size.

Detection and classification of the following sound: Scream, Gunshot, Explosion, Crashing glass

* + - 1. Thermal
				1. Classified object type: Person / Vehicle
				2. Support BestShot
				3. Analytics events on AI engine: Object detection, Virtual line(Crossing / Direction), Virtual area\*(Loitering / Intrusion / Enter / Exit)
				4. Analytics events: Motion detection.
		1. Interoperability – The camera shall be ONVIF Profile S / T / M compliant.
		2. The camera shall possess the following further characteristics:
			1. Micro SD/SDHC/SDXC memory card with configurable pre-alarm and post-alarm recording intervals
			2. NAS recording option with configurable pre-alarm and post-alarm recording intervals
			3. Alarms and notifications
				1. alarm notification triggers: Analytics, Network disconnect, Alarm input, MQTT subscription
				2. available notification means upon trigger:

File upload(image): e-mail/FTP

Notification: e-mail

Recording: SD/SDHC/SDXC or NAS recording at event triggers

Alarm output

Handover(PTZ preset, Send message by HTTP/HTTPS/TCP)

MQTT: publication

* + - 1. Pixel Counter available in the web viewer.
			2. IP66 / IP67, IK10, NEMA4X, NEMA TS-2(2.2.8, 2.2.9)
			3. **NDAA Compliant**
	1. **DETAILED SPECIFICATIONS**
		1. Video
			1. Thermal
				1. Imaging device: Uncooled VGA microbolometer
				2. Resolution: 640x480(can be scales up to 1280x960), 1280x960, 1280x720, 1024x768, 800x600, 800x448, 720x576, 720x480, 640x480, 640x360
				3. NETD: <60mK
				4. Pixel Size: 12㎛
			2. Visible
				1. Imaging device: 1/1.8" 8MP CMOS
				2. Resolution: 3840x2160, 3072x1728, 2592x1944, 2688x1520, 2560x1440, 2048x1536, 1920x1080, 1600x1200, 1280x1024,1280x960, 1280x720, 1024x768, 800x600, 800x448, 720x576, 720x480, 640x480, 640x360
				3. Minimum Illumination

Color: 0.06Lux (F1.3, 1/30sec)

BW: 0.004Lux (F1.3, 1/30sec), 0Lux (IR LED on)

* + - * 1. Video out for installation: Micro USB Type B, 1280x720 for installation
		1. Lens
			1. Thermal
				1. Focal length: 9.1mm fixed focal
				2. Max. Aperture Ratio: F1.0
				3. Field of View: H(50°) / V(37°) / D(63.8°)
				4. Min. Object Distance: 3.5m(11.48ft)
				5. Focus Control: Fixed
			2. Visible
				1. Focal length: 4.4~9.3mm(2.2x) motorized varifocal
				2. Max. Aperture Ratio: F1.3(Wide)~F2.15(Tele)
				3. Field of View

H: 112.1°(Wide) ~ 47.5°(Tele)

V: 58.0°(Wide) ~ 26.6°(Tele)

D: 137.5°(Wide) ~ 54.6°(Tele)

* + - * 1. Min. Object Distance: Wide 1.75m(5.74ft) / Tele 5.21m(17.09ft)
				2. Focus Control: Simple focus
		1. Pan / Tilt / Rotate: -170° ~ +170° / -40° ~ 50° / -
		2. Operational Functions
			1. Camera Title: Displayed up to 85 characters
			2. Day/Night: Auto (ICR) / Color / B/W / External / Schedule
			3. Backlight Compensation: Off / BLC / WDR / SSDR
			4. Wide Dynamic Range: 120dB
			5. Digital Noise Reduction: SSNRⅤ, WiseNRⅡ
			6. Digital Image Stabilization: Support (built-in gyro sensor)
			7. Motion Detection: Off / On (8ea, 4-point polygonal)
			8. Privacy Masking: Off / On (6ea, Rectangle zones)
			9. Gain Control: Off / Low / Middle / High
			10. White Balance: ATW / AWC / Manual / Indoor / Outdoor
			11. Lens Distortion Correction: Support
			12. Electronic Shutter Speed: Min / Max / Anti-flicker (1/5 ~ 1/12,000sec) \*Auto prefer shutter control(Based on AI engine)
			13. IR Viewable Length: 30m(98.42ft)
			14. Analytics events
				1. Thermal

Classified object type: Person/Vehicle

Support BestShot

Analytics events based on AI engine: Object detection, Virtual line(Crossing/Direction), Virtual area\*(Loitering/Intrusion/Enter/Exit)

Analytics events: Motion detection

* + - * 1. Visible

Classified object type: Person/Face/Vehicle/License plate

Attributes: Vehicle(car/bus/truck/motorcycle/bicycle)

Support BestShot

Analytics events based on AI engine: Object detection, Virtual line(Crossing/Direction), Virtual area\*(Loitering/Intrusion/Enter/Exit)

Analytics events: Defocus detection, Motion detection, Tampering, Audio detection, Sound classification, Shock detection, Virtual area(Appear/Disappear)

\* Some of the video analytics only works with people and vehicle detection

* + - 1. Alarm I/O: 4 configurable I/O ports
			2. Alarm Triggers: Analytics, Network disconnect, Alarm input, MQTT subscription
			3. Alarm Events
				1. File upload(image): e-mail/FTP
				2. Notification: e-mail
				3. Recording: SD/SDHC/SDXC or NAS recording at event triggers
				4. Alarm output
				5. Handover(PTZ preset, Send message by HTTP/HTTPS/TCP)
				6. MQTT: publication
			4. Audio input: Selectable (mic in/line in) \*Supply voltage (2.5V DC, 4mA), Input impedance(2KOhm)
			5. Audio Out: Line out (Max. output level 1Vrms)
			6. Edge Storage: Micro SD/SDHC/SDXC 2 slots 512GB
			7. Memory: 4608MB RAM, 512MB Flash
			8. Thermal Color Palettes: Whitehot, Blackhot, Rainbow, Rainbow2, Sepia, Red, Iron, Custom
		1. Radiometry(Thermal)
			1. Temperature detect range: -20°C ~ 130°C(-4°F ~ 266°F)
			2. Temperature accuracy: ±5°C (≤100°C ), ±20°C(＞100°C ) \* This temperature accuracy is based on testing the minimum object distance (MoD) at room temperature as a reference value.
			3. Temperature detection: 10 Polygonal ROI zones, whole FoV area
			4. Hybrid palettes, Spot temperature reading
		2. Stream
			1. Video compression: H.265, H.264, MJPEG
			2. Audio Compression
				1. G.711 u-law /G.726 Selectable
				2. G.726(ADPCM) 8KHz, G.711 8KHz
				3. G.726: 16Kbps, 24Kbps, 32Kbps, 40Kbps
				4. AAC-LC: 48Kbps at 16KHz
			3. Smart Codec
				1. Thermal: WiseStream Ⅱ
				2. Visible: Manual(5ea area), WiseStream Ⅲ(Based on AI engine support)
			4. Max. Framerate
				1. Thermal:

H.265/H.264: Max. 30fps/25fps(60Hz/50Hz), 15fps (Both channel AI on)

MJPEG: Max. 3fps

* + - * 1. Visible:

H.265/H.264: Max. 30fps/25fps(60Hz/50Hz), 15fps (Both channel AI on)

MJPEG: Max. 1fps

* + - 1. Bitrate Control Method
				1. H.265 / H.264: CBR or VBR
				2. MJPEG: VBR
			2. Streaming Capability: Unicast(6 users) / Multicast, Multiple streaming(Up to 3 profiles)
			3. Streaming method: Unicast / Multicast
			4. Simultaneous Users: 6 maximum (Unicast)
			5. Profile set: Max. 10 ea
			6. Interoperability
				1. ONVIF Profile S / T / M
				2. SUNAPI(HTTP API)
				3. Wisenet Open Platform (Visible channel only)
		1. Network
			1. Connectivity: Metal shielded RJ-45(10/100/1000BASE-T)
			2. Protocol: IPv4, IPv6, TCP/IP, UDP/IP, RTP(UDP), RTP(TCP), RTCP, RTSP, NTP, HTTP, HTTPS, SSL/TLS, DHCP, FTP, SMTP, ICMP, IGMP, SNMPv1/v2c/v3(MIB-2), ARP, DNS, DDNS, QoS, UPnP, Bonjour, LLDP, SRTP (TCP, UDP Unicast), MQTT
			3. DDNS – The camera shall support DDNS services offered by the manufacturer and others publicly available service offerings
			4. QoS – Layer 3 DSCP
			5. Security Feature
				1. OS / Firmware Protect: Encrypted Firmware, Secure boot, Signed Firmware
				2. User authentication: Digest Authentication
				3. Network authentication: IEEE 802.1X (EAP-TLS, EAP-LEAP, EAP-PEAP, MSCHAPv2)
				4. Secure Communication: HTTPS, WSS (WebSocket Secure)
				5. Access Control: IP-based access control
				6. Data Protect: Encryption Credentials, Encrypt compress for live recording file
				7. Audit: Access / System / Event Log management
				8. Device ID: Device certificate (Hanwha Private Root CA)
				9. Secure Storage: HTPM(Hanwha Trusted Platform Module), SDcard partition encrypt
				10. Security Certificate: TPM with FIPS 140-2 level 2
				11. The device shall not provide a manufacture default password. Default password change shall be required to access the camera.
				12. A minimal level of password complexity shall be required by the camera.
				13. The camera shall not have a manufacture back-door password.
				14. The manufacturer shall provide a tool that provides the ability to make password changes to multiple cameras at the same time.
				15. IP address filtering – List of allowed or blocked IP addresses
			6. Discovery – The manufacturer shall offer a discovery program to identify all devices of them on the network.
			7. Configuration – The manufacturer shall offer a configuration program that remotely allows users to change settings on multiple cameras simultaneously.
			8. Firmware upgrade – The manufacturer shall offer a program capable of upgrading multiple cameras at the same time (not requiring access to individual cameras).
			9. Camera backup setting – The manufacturer shall provide a program that provides the ability to save multiple camera settings to a file and restore these camera settings if needed.
			10. Reporting – The manufacturer shall provide a tool that can generate a report including thumbnail view, MAC address, IP address, serial number and other camera settings.
		2. Electrical
			1. Input Voltage: PoE+(IEEE802.3at, Class4), 12VDC
			2. Power Consumption
				1. PoE+: Max 25.5W, Typical 16.0W
				2. 12VDC: Max 21.5W, Typical 14.0W
		3. Mechanical And Environmental
			1. Color / Material: White/Aluminum
			2. RAL Code: RAL9003
			3. Dimension (W x H x D): 353.4 x 287.5 x 191.2 mm (13.92 x 11.32 x 7.53 ")
			4. Weight: 4.53 kg (9.99 lb)
			5. Temperature / Humidity
				1. Operating: -40°C to +60°C(-58°F to +140°F) / Less than 95% RH(non-condensing)
				2. Storage: -50°C to +60°C(-58°F to +140°F) / Less than 95% RH (non-condensing)
			6. Ingression Protection: IP66 / IP67
			7. Vandal Resistance: IK10
			8. NEMA4X, NEMA TS 2(2.2.8, 2.2.9)
		4. DORI (Visible)
			1. Detect (25PPM/ 8PPF): Wide 51.7m(169.94ft) / Tele 174.5m(572.64ft)
			2. Observe (63PPM/ 19PPF): Wide 20.7m(67.85ft) / Tele 69.8m(229.06ft)
			3. Recognize (125PPM/ 38PPF): Wide 10.3m(33.93ft) / Tele 34.9m(114.53ft)
			4. Identify (250PPM/ 76PPF): Wide 5.2m(16.96ft) / Tele 17.5m(57.26ft)
		5. Certification & Standards
			1. EMC
				1. FCC 47 CFR Part 15 Subpart B
				2. ICES-3(A) / NMB-3(A)
				3. CE / UKCA: EN 55032 Class A, EN 50130-4, EN 610003-2, EN 610003-3:2013
				4. VCCI-CISPR 32 Class A
				5. RCM AS/NZS CISPR 32 Class A
			2. Safety
				1. UL / CSA 62368-1
				2. KC 62368-1
			3. Environment
				1. RoHS CE EN 50581:2012 (hazardous substances)
				2. IEC/EN 60529 IP66/IP67, IEC/EN 62262 IK10
				3. NEMA 250 type 4X, NEMA TS-2

END OF SECTION