



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

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15 MP MULTI-SENSOR 180 / 220° PANORAMIC CAMERA

DIVISION 28 – ELECTRONIC SAFETY AND SECURITY

Notes to Specifier:

1. Where several alternative parameters or specifications exist, or where, the specifier has the option of inserting text, such choices are presented in **<bold text>**.
2. Explanatory notes and comments are presented in **colored** text.

Important: See further notes on the following page.

Important Note to Security Systems Specifiers

CSI MasterFormat 2016 incorporates numerous significant changes affecting electronic safety and security. This document is written to provide flexibility in using either format, although adoption of MasterFormat 2016 is encouraged. The following is a guide to the MasterFormat numbers relevant to the product referenced in this specification.

Primary Specification Area:**MasterFormat 2014:**

28 20 00	Electronic Surveillance
28 23 00	Video Surveillance
28 23 29	Video Surveillance Remote Devices and Sensors

MasterFormat 2016:

28 20 00	Video Surveillance
28 2x xx	Surveillance Cameras
28 2x xx	IP Cameras

Related Requirements:**MasterFormat 2014:**

27 20 00	Data Communications
28 23 13	Video Surveillance Control and Management Systems
28 23 16	Video Surveillance Monitoring and Supervisory Interfaces
28 23 19	Digital Video Recorders and Analog Recording Devices
28 23 23	Video Surveillance Systems Infrastructure

MasterFormat 2016

27 15 01.xx	Video Surveillance Communications Conductors and Cables
27 20 00	Data Communications
28 05 xx.xx	PoE Power Sources for Electronic Safety and Security
28 05 xx	Storage Appliances for Electronic Safety and Security
28 05 xx.xx	Network Video Recorders
28 05 xx	Cyber Requirements for Electronic Safety and Security
28 05 xx	Safety and Security Network Communications Equipment
28 2x 00	Video Management System

15 MP MULTI-SENSOR 180 / 220° PANORAMIC CAMERA**PART 1 GENERAL****1.01 SUMMARY**

- A. Section includes a 15 MP MULTI-SENSOR 180 / 220° PANORAMIC CAMERA
- B. Product - A 15 MP MULTI-SENSOR PANORAMIC camera with multi-streaming (H.265, H.264 and MJPEG) capability
- C. Related Requirements

Refer to MasterFormat notes at the beginning of this document to select requirements specific to the MasterFormat version being used in the specification.

1.02 REFERENCES**A. Abbreviations**

- | | |
|-----------|-------------------------------------|
| 1. AGC | Auto Gain Control |
| 2. AES | Advanced Encryption Standard |
| 3. API | Application Programming Interface |
| 4. ARP | Address Resolution Protocol |
| 5. AWB | Auto White Balance |
| 6. BLC | Back light compensation |
| 7. CBR | Constant Bit Rate |
| 8. CVBS | Composite Video Blanking and Sync |
| 9. DHCP | Dynamic Host Configuration Protocol |
| 10. DNR | Digital Noise Reduction |
| 11. DNS | Domain Name Server |
| 12. DDNS | Dynamic Domain Name Server |
| 13. DSCP | Differentiated Services Code Point |
| 14. fps | frames per second |
| 15. FTP | File Transfer Protocol |
| 16. GOV | Group of Video |
| 17. GUI | Graphical User Interface |
| 18. HD | High Definition |
| 19. HTTP | Hypertext Transfer Protocol |
| 20. HTTPS | Secure HTTP |
| 21. ICMP | Internet Control Message Protocol |
| 22. IGMP | Internet Group Management Protocol |
| 23. IP | Internet Protocol |
| 24. IR | Infrared |
| 25. JPEG | Joint Photographic Experts Group |
| 26. LAN | Local Area Network |

27. LED	Light Emitting Diode
28. LDC	Lens Distortion Correction
29. LPR	License Plate Recognition
30. MJPEG	Motion JPEG
31. MP	Megapixel
32. MPEG	Moving Pictures Experts Group
33. NAS	Network Attached Storage
34. NTP	Network Time Protocol
35. NVR	Network Video Recorder
36. PIM-SM	Protocol Independent Multicast-Sparse Mode
37. PoE	Power over Ethernet
38. PPPoE	Point to Point Protocol over Ethernet
39. QoS	Quality of Service
40. RTP	Real-Time Transport Protocol
41. RTCP	Real-Time Control Protocol
42. RTSP	Real-Time Streaming Protocol
43. SDK	Software Development Kit
44. SFP	Small Form factor Pluggable
45. SMTP	Simple Mail Transfer Protocol
46. SNMP	Simple Network Management Protocol
47. SSDR	Super Smart Dynamic Range
48. SSNR	Super Smart Noise Reduction
49. SSL	Secure Sockets Layer
50. TCP	Transmission Control Protocol
51. UDP	User Datagram Protocol
52. UPnP	Universal Plug and Play
53. VBR	Variable Bit Rate
54. VMS	Video Management System
55. WDR	Wide Dynamic Range

B. Reference Standards

1. Network - IEEE
 - a. 802.3 Ethernet Standards
 - b. 802.1x Port-based Network Access Control
 - c. IPv4 IP addressing version 4
 - d. IPv6 IP addressing version 6
 - e. QoS Quality of Service
2. Video
 - a. ISO / IEC 23008-2:2013, MPEG-H Part2 (ITU H.265, HEVC)
 - b. ISO / IEC 14496–10, MPEG-4 Part 10 (ITU H.264)
 - c. ISO / IEC 10918 – JPEG

- d. ONVIF – Profile S / G
- 3. Emission
 - a. FCC Part 15 Subpart B Class A
 - b. ICES-003:2016 Class A
 - c. CE EN 55032:2015 Class A
- 4. Immunity - CE
 - a. EN 50130-4:2011+A1:2014
 - b. EN 61000-4-2:2009
 - c. EN 61000-4-3:2006/A2:2010
 - d. EN 61000-4-4:2012
 - e. EN 61000-4-5:2014
 - f. EN 61000-4-6:2014
 - g. EN 61000-4-11:2004
- 5. Safety
 - a. UL listed
 - b. CE EN 50581:2012 (hazardous substances)
- C. Definitions
 - 1. GOV (Group of Video object planes) – A set of video frames for H.264 and H.265 compression, indicating a collection of frames from the initial I-Frame (key frame) to the next I-Frame. GOV consists of two kinds of frames in video surveillance setup: I-Frame and P-Frame.
 - 2. Dynamic GOV – Dynamic assignment of GOV length based on the complexity of the scene to efficiently manage bitrate of the video stream and reduce the storage required.
 - 3. Multi-exposure wide dynamic range – Operation which automatically adjusts shutter speed to provide a wide range between dark and light areas visible at the same time, preventing backlighting issues. Long exposure is used for dark areas and a short exposure is used in bright areas.
 - 4. Dynamic fps – Dynamic assignment of fps (frames per seconds) based on the movement of object(s) in the scene to efficiently manage bitrate of the video stream and reduce the storage required.
 - 5. Smart Codec – Codec that controls quantization parameter, fps, and GOV length in H.265 and H.264 to efficiently manage bitrate of the video stream and reduce the storage required. Smart Codec may be referred to as WiseStream in this document.
 - 6. Multi-Sensor Panoramic Camera – A camera which can produce a panoramic video stream stitched from several sensors inside one body.

1.03 SUBMITTALS

- A. Product Data
 - 1. Manufacturer's printed or electronic data sheets
 - 2. Manufacturer's installation and operation manuals
 - 3. Warranty documentation

1.04 QUALIFICATIONS

- A. Manufacturer shall have a minimum of five years' experience in producing IP video equipment.
- B. Installers shall be trained and authorized by the Manufacturer to install, integrate.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Deliver the camera in the manufacturer's original, unopened, undamaged container with identification labels intact.
- B. Store the camera in a temperature environment specified in section 2.04 Detailed Specification, protected from mechanical and environmental conditions as designated by the manufacturer.

1.06 WARRANTY, LICENSING AND SUPPORT

- A. Manufacturer shall provide at least a limited 3 year warranty for the product to be free of defects in material and workmanship.
- B. Manufacturer shall provide embedded camera video analytics free of license charges.

END OF SECTION

PART 2 PRODUCTS

2.01 EQUIPMENT

- A. Manufacturer: Hanwha Techwin
<http://www.hanwha-security.com/>
- B. Model PNM-9030V
- C. Alternates: None

2.02 GENERAL DESCRIPTION

- A. Video Compression and Transmission – The camera shall have the following properties relating to the video signals it produces.
 - 1. H.265, H.264 and MJPEG compression, each derived from a dedicated encoder and capable of being streamed independently and simultaneously.
 - a. H.265 and H.264 – maximum of 30fps at all resolution
 - b. MJPEG – maximum of 15fps at under 2MP
 - 2. The camera shall be able to select the panoramic mode between 180° and 220°.
 - 3. The camera shall support panoramic stitching, original and crop view channels at the same time.
 - 4. The camera shall be able to configure up to 5(@180°) or 3(@220°) independent video stream profiles per channel with differing encoding, quality, frame rate, resolution, and bit rate settings.
 - 5. The camera shall be able to configure various resolution selections.
 - a. 180° mode: 6096x2540, 5760x2400, 5472x2280, 5184x2160, 4800x2000, 4560x1900, 4096x1704, 3840x1600, 2688x1120, 2560x1064, 2048x852, 1920x800, 1280x532, 640x264
 - b. 220° mode: 7744x1936, 6096x1524, 5760x1440, 5472x1368, 5184x1296, 4800x1200, 4560x1140, 4096x1024, 3840x960, 2688x672x 2560x640, 2048x512, 1920x480, 1280x320, 640x160
 - 6. The camera shall support unicast video streaming up to 15 users.
 - 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 smart codec (WiseStream II, Dynamic GOV, and Dynamic fps) to efficiently manage bit rate of the video stream and reduce storage while producing video quality that is visually equal to the one without smart codec.
- B. Camera – The camera device shall have the following physical and performance properties:
 - 1. The camera shall be able to produce clear images in highly contrast scenes with multi-exposure wide dynamic range up to 120dB.
 - 2. The camera shall support digital noise reduction using both 2D and 3D noise reduction technology.
 - 3. The camera shall be able to configure 16 privacy masking areas with rectangles.
 - 4. The camera shall have the defog feature to remove fogginess of scene which can be triggered automatically from the fog detection event.
- C. Intelligence and Analytics – The camera shall have a suite of intelligent analytic functions.
 - 1. Motion detection with eight definable detection areas with eight point polygonal zones, and minimum/maximum object size.

2. Motion detection handover to call a preset of PTZ camera when motion event is triggered.
 3. Detection of logical events of specified conditions from the camera's video
 - a. Tampering
 - b. Loitering
 - c. Directional detection
 - d. Virtual line
 - e. Enter/Exit
 - f. (Dis)Appear,
 - g. Audio detection
 - h. Motion detection
 - i. Sound Classification
 - j. Heatmap
 4. Detection and classification of the following sound.
 - a. Scream
 - b. Gunshot
 - c. Explosion
 - d. Crashing glass
- D. Interoperability – The camera shall be ONVIF Profile S and G compliant.
- E. The camera shall possess the following further characteristics:
1. Built-in web server, accessed via non-plugin browsers including Google Chrome, MS Edge, Mozilla Firefox and Apple Safari.
 2. Micro SD/SDHC/SDXC memory card with configurable pre-alarm and post-alarm recording intervals
 3. NAS recording option with configurable pre-alarm and post-alarm recording intervals
 4. Alarms and notifications
 - a. alarm notification triggers:
 - 1) Alarm input
 - 2) Motion detection
 - 3) Video & Audio analytics
 - 4) Network disconnect
 - b. available notification means upon trigger:
 - 1) File Upload via FTP and E-mail
 - 2) Notification via E-mail
 - 3) Local storage (SD / SDHC / SDXC) or NAS recording at event triggers
 - 4) External output
 5. Pixel Counter available in the web viewer.
 6. PoE+ capable
 7. IP66, IK10 capable

2.03 CAMERA SOFTWARE

- A. The camera shall have a built in web server which supports non-plugin browsers including Google Chrome, MS Edge, Mozilla Firefox and Apple Safari from a PC or Mac.
- B. The web viewer shall provide a monitoring screen which displays live camera video and simultaneously provides same-screen access to the following functions:
 - 1. Live view window size
 - 2. Resolution setting
 - 3. Image (snapshot) capture
 - 4. Manual recording to SD or NAS
 - 5. Audio/microphone control
 - 6. Access recorded data playback and camera configuration menus
- C. The web viewer shall provide a playback screen which provides access to the following functions:
 - 1. Recorded data search using date and time range
 - 2. Recorded data search using event type
 - 3. Play a recorded video by event triggering
 - 4. Set resolution
 - 5. Play audio if present
 - 6. Generate a backup copy of saved video data
- D. The web viewer shall provide a setup screen which provides access to the following configuration settings and functions in the camera:
 - 1. Digital video profile to include compression type, maximum or target bit rate, frame rate, multicast parameters, and crop encoding area
 - 2. User profile to include password, access level, authentication
 - 3. Date and time
 - 4. Network settings and IP version
 - a. DDNS
 - b. IP filtering
 - c. SSL, including certificate management
 - d. 802.1x authentication
 - e. Quality of Service settings
 - f. SNMP to include version selection and settings
 - g. Auto IP configuration
 - 5. Video setup
 - a. Flip / mirror mode
 - b. Video output type
 - c. Privacy zone.
 - 6. Audio setup to include source, audio codec type, gain and bit rate.
 - 7. Image alignment to configure 180 / 220° mode and optimized target distance.
 - 8. Camera settings to configure image preset, sensor frame capture, dynamic range, white balance, back light, exposure, day/night operation, on-screen display, sharpness, contrast, color level and lens distortion correction.
 - 9. Event detection setup to configure notification parameters, recording rules, time schedule, tamper protection, motion detection and event triggers

10. System function to control reboot, upgrade, check system and event logs and application (SDK) management
11. View profile information

E. Client requirements

1. Acceptable Operating Systems: Windows 7 / 8.1 / 10, MAC OS X 10.10, 10.11, 10.12
2. Acceptable browsers:
 - a. Non-plugin WebViewer Google Chrome, MS Edge, Mozilla Firefox, Safari (Mac OS X only)

2.04 DETAILED SPECIFICATIONS

A. Video

1. Imager

- a. Sensor 1/2.8" 5MP CMOS x 4CH
 - 1) Image Pixels Total: 2,704(H) x 2,104(V) 5.69M x 4CH
Effective: 2,616(H) x 1,964(V) 5M x 4CH
 - 2) Scanning Progressive
- b. Minimum Illumination
 - 1) Color Mode 0.15Lux (F2.0, 1/30sec, 30IRE)
 - 2) Black & White Mode 0.01Lux (F2.0, 1/30sec, 30IRE)
 - 3) Pan / Tilt Range 355° / 60°
- c. Video Out (Installation) USB: Micro USB type B
- d. The following features with control settings shall be available:
 - 1) Camera Title Off / On (Displayed up to 75 characters)
 - a) WW English / Numeric / Special characters
 - b) China English / Chinese / Numeric / Special characters
 - c) Common Multi-line (Max. 5), Color (Grey/Green/Red/Blue/Black/White), Transparency, Auto scale by resolution
 - 2) Day/Night Setting Auto (ICR) / Color / B/W / Schedule
 - 3) Backlight Compensation (BLC) Off / BLC / HLC (Masking / Dimming) / WDR
 - 4) WDR 120dB
 - 5) Contrast Enhancement Off / On (SSDR)
 - 6) Digital Noise Reduction (DNR) Off / On (SSNR3 : 2D+3D Noise Filter)
 - 7) Digital Image Stabilization Off / On
 - 8) Defog Off / Manual / Auto
 - 9) Motion Detection Off / On (8ea, 8-point polygonal)
 - 10) Privacy Masking Off / On (16 zones, rectangle)
 - Color: Gray / Green / Red / Blue / Black / White
 - Mosaic
 - 11) Gain Control Off / Low / Middle / High

- 12) White Balance ATW / AWC / Manual / Indoor / Outdoor
(Including Mercury and Sodium)
- 13) Electronic Shutter Speed Min / Max / Anti-flicker (1 ~ 1/12,000sec)
- 14) Digital Zoom 24x
- 15) Digital PTZ Support
- 16) Image Rotation Flip: Off / On
Mirror: Off / On
- 17) Alarm I/O Input 1ea / Output 1ea
- 18) Alarm Triggers Alarm Input, Motion Detection,
Video & Audio Analytics,
Network Disconnection
- 19) Alarm Events File Upload via FTP and E-mail,
Notification via E-mail,
Local storage (SD / SDHC / SDXC) or
NAS recording at event triggers,
External output, Preset
- 20) Pixel Counter Support

e. Lens: 4mm

- 1) Max. Aperture Ratio F2.0
- 2) Field of View [180° mode] H: 180° V: 70°
[220° mode] H: 220° V: 52°
- 3) Min. Object Distance 3m (9.84ft)
- 4) Focus Control Fixed
- 5) Mount Type Board-in Type (M12)

2. Video Streams

- a. The camera shall be able to produce 5 or 3 video profiles per channel, each of which may have the following properties:

- 1) Encoding Type
 - a) H.265
 - b) H.264
 - c) MJPEG
- 2) Resolution
 - 180° mode: 6096x2540, 5760x2400, 5472x2280, 5184x2160,
4800x2000, 4560x1900, 4096x1704, 3840x1600,
2688x1120, 2560x1064, 2048x852, 1920x800,
1280x532, 640x264
 - 220° mode: 7744x1936, 6096x1524, 5760x1440, 5472x1368,
5184x1296, 4800x1200, 4560x1140, 4096x1024,
3840x960, 2688x672x 2560x640, 2048x512,
1920x480, 1280x320, 640x160
- 3) Maximum Framerate
 - a) H.265 / H.264 Max. 30fps at all resolutions

- b) MJPEG Max. 15fps at under 2MP
 - 4) Smart Codec WiseStream II, Dynamic GOV, Dynamic fps
 - 5) Bitrate Control Method H.265 / H.264: CBR or VBR
MJPEG: VBR
- 3. Streaming Capability Up to 5 or 3 profiles for each channel
- 4. Simultaneous Users (Total) 15 maximum (Unicast)
- 5. Audio
 - a. Audio In Line-in
(Supply voltage: 2.5VDC (4mA),
Input impedance: approx. 2K Ohm)
 - b. Audio Out Line out (3.5mm stereo mini jack)
 - c. Compression Format G.711 u-law / G.726 Selectable, G.726 (ADPCM) 8KHz,
G.711 8KHz, G.726: 16Kbps, 24Kbps, 32Kbps, 40Kbps,
AAC-LC: 48Kbps at 16KHz
 - d. Communication Bi-directional (2-Way)
- 6. Storage and Recording
 - a. The camera shall have an onboard SD card storage
 - 1) Card Type Micro SD/SDHC/SDXC
 - 2) Capacity 512GB (256GB x 2 slots)
 - 3) Video or images content on the card shall have the ability to be downloaded to a selected destination
 - b. NAS
 - c. The capacity of the SD card storage capacity shall not be compromised by other factors such as 3rd party applications
- 7. Interoperability – Video streams shall be capable of supporting ONVIF Profile S / G
- 8. Still Image – The camera shall support image screenshot and export
- B. Network
 - 1. Connectivity – 10/100 Base-T Ethernet via RJ-45 connector
 - 2. Protocol
 - a. IP v4 / v6, TCP, UDP
 - b. Configuration: DHCP
 - c. Web service: HTTP, HTTPS
 - d. Network Service: ARP, Bonjour, DNS, ICMP, NTP, PIM-SM, SNMP v1/2c/3 – MIB-2, UPnP
 - e. Media: RTP, RTCP, RTSP
 - f. Multicast: IGMP
 - g. Notifications: FTP, SMTP
 - h. Remote Access: PPPoE
 - 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

- a. User password protection
 - b. The device shall not provide a manufacture default password. Default password change shall be required to access the camera.
 - c. A minimal level of password complexity shall be required by the camera.
 - d. The camera shall not have a manufacture back-door password.
 - e. The manufacturer shall provide a tool that provides the ability to make password changes to multiple cameras at the same time.
 - f. IP address filtering – List of allowed or blocked IP addresses
 - g. HTTPS(SSL) login authentication
 - h. HTTPS(SSL) secured communication
 - i. Digest login authentication
 - j. User access log
 - k. 802.1x authentication
- 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.

C. Electrical

1. Power

- a. Input Voltage / Current PoE+ (IEEE 802.3at), DC 12V
- b. Power Consumption Max 25.5W (PoE+), Max 21W (DC 12V)

D. Mechanical And Environmental

- 1. Material Aluminum
- 2. Dimensions (W x H x D) Ø253 x H165mm (9.96" x 6.5")
- 3. Weight 3.2Kg (7.1lb)
- 4. Temperature
 - a. Operating -40°C ~ +55°C (-40°F ~ +131°F)
 - b. Storage -40°C ~ +60°C (-40°F ~ +140°F)
- 5. Humidity Less than 90% RH
- 6. Ingression Protection IP66
- 7. Vandal Resistance IK10

END OF SECTION

PART 1 EXECUTION

1.01 INSTALLERS

- A. Contractor personnel shall comply with all applicable state and local licensing requirements.

1.02 PREPARATION

- A. The network design and configuration shall be verified for compatibility and performance with the camera(s).
- B. Network configuration shall be tested and qualified by the Contractor prior to camera installation.
- C. All firmware found in products shall be the latest and the most up-to-date provided by the manufacturer, or of a version as specified by the provider of the VMS or NVR.
- D. All equipment requiring users to log on using a password shall be configured with user/site-specific password/passwords. No system/product default passwords shall be allowed.

1.03 INSTALLATION

- A. The contractor shall carefully follow instructions in documentation provided by the manufacturer to insure all steps have been taken to provide a reliable, easy-to-operate system.
- B. All equipment shall be tested and configured in accordance with instructions provided by the manufacturer prior to installation.
- C. Before permanent installation of the system, the contractor shall test the system in conditions simulating the final installed environment.

1.04 STORAGE

- A. The hardware shall be stored in an environment where temperature and humidity are in the range specified by the manufacturer.

END OF SECTION