

열화상 카메라 | SWIR | 초분광 | 머신비전



OZRAY

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Image credits: LYNRED www.lynred.com/blog



회사 소개

OZRAY Thinking at a future time!

오즈레이는 1984년도에 설립 후 여러 번의 발전을 거듭하여 현재에 이르러, 적외선 영역대의 카메라를 설계, 생산하여 국내외로 판매하고 있는 특화된 회사입니다.

생산 제품으로는 단파장(SWIR), 중파장(MWIR), 장파장(LWIR, 열화상), Automobile(GMSL) 카메라와 모듈, 열선 열화상 렌즈, 분광기(Spectrograph), Portable 초분광 데이터 수집장치 등을 생산하여 국내외로 판매하고 있습니다.

적용 분야로는 고, 저온 측정, 열화상 CCTV & 화재감지, 초분광, Machine Vision, Defense, 가축/가금류/인체 발열측정, Gas 감시, 열화상 블랙박스, 스모그/안개 투과, 항공우주 등이 있습니다.

오즈레이는 지속적인 적외선 카메라 설계 기술, 카메라를 이용한 응용기술 축적을 통해 국가의 산업에 이바지하는 회사로 발전하는 것이 목표입니다.

열화상 카메라 Thermal Imaging Camera

Thermographic 어플리케이션에서 사용되는 Deneb(GigE, UDP)와 Surveillance, 원격 온도측정 등에 사용하는 열화상 IP 카메라인 HK Series(RTSP), 700°C 이상의 고온 측정이 가능한 카메라와 특수목적의 야간 감시용 카메라 등이 있습니다. 또한 Automotive 전용인 GMSL 열화상 카메라와 인체 발열 측정 kiosk와 Lens, 열선렌즈 등이 있습니다.

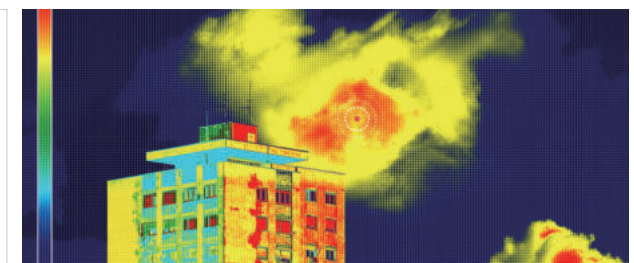
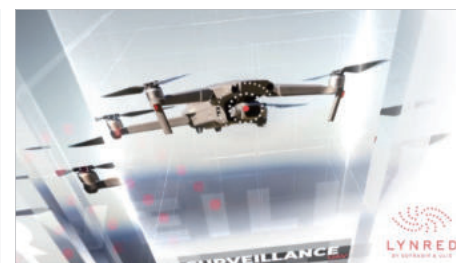
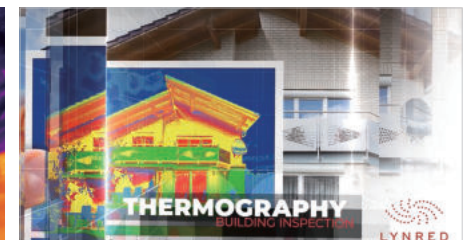
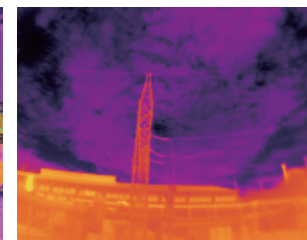
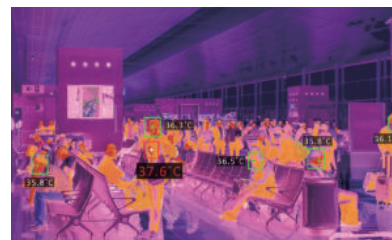
열화상 카메라는 각 분야의 온도측정, 인체/가축/가금류 온도 감시, Surveillance, Machine Vision, 화재감지, 드론, 차량용 블랙박스 등의 다양한 분야에서 사용이 가능합니다

DENEb Series : UDP & GigE Vision



Model	Resolution	Frame Rate	Sensor	Protocol	Pixel size	Wavelength	Measurement Temp.	Accuracy
DE384F30IPE	384x288	30fps	α -Si microbolometer	OZRAY own proprietary	17um	8~14um	0 ~ 500°C	$\pm 2^{\circ}\text{C}$ or 2%
DE384F60IPE	384x288	60fps	α -Si microbolometer	OZRAY own proprietary	17um	8~14um	0 ~ 500°C	$\pm 2^{\circ}\text{C}$ or 2%
DE640F30IPE	640x480	30fps	α -Si microbolometer	OZRAY own proprietary	17um	8~14um	0 ~ 500°C	$\pm 2^{\circ}\text{C}$ or 2%
DE640F60IPE	640x480	60fps	α -Si microbolometer	OZRAY own proprietary	17um	8~14um	0 ~ 500°C	$\pm 2^{\circ}\text{C}$ or 2%
DE640F120IPE	640x480	120fps	α -Si microbolometer	OZRAY own proprietary	17um	8~14um	0 ~ 500°C	$\pm 2^{\circ}\text{C}$ or 2%
DEs640F30IPE	640x480	30fps	Vox microbolometer	OZRAY own proprietary	12um	8~14um	0 ~ 500°C	$\pm 2^{\circ}\text{C}$ or 2%
DEs640F60IPE	640x480	60fps	Vox microbolometer	OZRAY own proprietary	12um	8~14um	0 ~ 500°C	$\pm 2^{\circ}\text{C}$ or 2%

Model	Resolution	Frame Rate	Sensor	Protocol	Pixel size	Wavelength	Measurement Temp.	Accuracy
DE384F30GE	384x288	30fps	α -Si microbolometer	GigE Vision	17um	8~14um	0 ~ 500°C	$\pm 2^{\circ}\text{C}$ or 2%
DE384F60GE	384x288	60fps	α -Si microbolometer	GigE Vision	17um	8~14um	0 ~ 500°C	$\pm 2^{\circ}\text{C}$ or 2%
DE640F30GE	640x480	30fps	α -Si microbolometer	GigE Vision	17um	8~14um	0 ~ 500°C	$\pm 2^{\circ}\text{C}$ or 2%
DE640F60GE	640x480	60fps	α -Si microbolometer	GigE Vision	17um	8~14um	0 ~ 500°C	$\pm 2^{\circ}\text{C}$ or 2%
DE640F120GE	640x480	120fps	α -Si microbolometer	GigE Vision	17um	8~14um	0 ~ 500°C	$\pm 2^{\circ}\text{C}$ or 2%
DEs640F30GE	640x480	30fps	Vox microbolometer	GigE Vision	12um	8~14um	0 ~ 500°C	$\pm 2^{\circ}\text{C}$ or 2%
DEs640F60GE	640x480	60fps	Vox microbolometer	GigE Vision	12um	8~14um	0 ~ 500°C	$\pm 2^{\circ}\text{C}$ or 2%



열화상 카메라 Thermal Imaging Camera

HK Series : IP Camera



Model	Resolution	Frame Rate	Sensor	Protocol	Pixel size	Wavelength	Measurement Temp.	Accuracy
HK380	384x288	10fps	α -Si microbolometer	RTSP	17um	8~14um	0 ~ 500°C	±2°C or 2%
HK384SIP	384x288	30fps	α -Si microbolometer	RTSP	17um	8~14um	0 ~ 500°C	±2°C or 2%
HK640SIP	640x480	30fps	α -Si microbolometer	RTSP	17um	8~14um	0 ~ 500°C	±2°C or 2%
HKs640SIP	640x480	30fps	Vox microbolometer	RTSP	12um	8~14um	0 ~ 500°C	±2°C or 2%
HK384DIP	384x288	30fps	α -Si microbolometer	RTSP	17um	8~14um	0 ~ 500°C	±2°C or 2%
HK640DIP	640x480	15fps	α -Si microbolometer	RTSP	17um	8~14um	0 ~ 500°C	±2°C or 2%
HKs640DIP	640x480	15fps	Vox microbolometer	RTSP	12um	8~14um	0 ~ 500°C	±2°C or 2%





High Temperature Measurement Camera

Model	Resolution	Frame Rate	Protocol	Wavelength	Measurement Temp.	Accuracy
DEe640F30ht	640 x 480	30fps	OZRAY own propriety	0.85 ~ 1.1um	700°C ~ 1800°C	±2%



Automotive Camera

Model	Resolution	Frame Rate	Sensor	Protocol	Pixel size	Wavelength
DEs640F30GM	640x480	30fps	Vox microbolometer	GMSL1 (1.7Gbps)	12um	8~14um
DEs640F60GM	640x480	60fps	Vox microbolometer	GMSL1 (1.7Gbps)	12um	8~14um



CCTV Camera for Surveillance

Model	Resolution	Frame Rate	Sensor	Protocol	Pixel size	Wavelength
HKe640SIP	640x480	30fps	Vox microbolometer	ONVIF	12um	8~14um
HK80e	80 x 60	30fps	Un-cooled Microbolometer	ONVIF	34um	8-14um

SWIR Camera

PAMINA는 VNIR camera(0.4um ~ 1.1um) , VSWIR(0.4um ~ 1.7um), SWIR(0.9um ~ 1.7um) 등의 카메라로 분류되며, Interface로는 Camera Link, GigE Vision, CoaxPress, RTSP를 갖으며, Cooled or Non-TEC 타입이 있습니다.

또한 PAMINA는 Visual Camera로 영상획득이 어려운 어플리케이션에서 영상획득이 가능하며, 특히 연무, 안개, 실리콘 등의 물질을 투과하며 플라스틱 용기의 내부 물질의 양을 검증할 수도 있고, Surveillance, Hyperspectral imaging (초분광), Machine Vision 등에 사용할 수 있습니다.



Visible + NIR Camera

Model	Resolution	Frame Rate	Sensor	Pixel size	Wavelength	Interface
PA5120F91NCP	5120x5120	91fps	Area NIR Global shutter	2.5um	0.4~1.1um	CoaxPress
PA1280F40GE	1280x1024	40fps	Area NIR Rolling shutter	10um	0.4~1.1um	GigE Vision



Visible + SWIR Camera

Model	Resolution	Frame Rate	Sensor	Pixel size	Wavelength	Interface
PA1280F70NCL	1280x1024	71fps	Area InGaAs Non-TEC	5um	0.4~1.7um	Camera Link
PA1280F70NCLd	1280x1024	71fps	Area InGaAs Non-TEC	5um	0.4~1.7um	Camera Link
PA1280F50NGE	1280x1024	50fps	Area InGaAs Non-TEC	5um	0.4~1.7um	GigE Vision

SWIR IP Camera

Model	Resolution	Frame Rate	Sensor	Pixel size	Wavelength	Interface
PAs640NIP	640x512	30fps	Area InGaAs Non-TEC	15um	0.9~1.7um	RTSP



SWIR Analog Camera

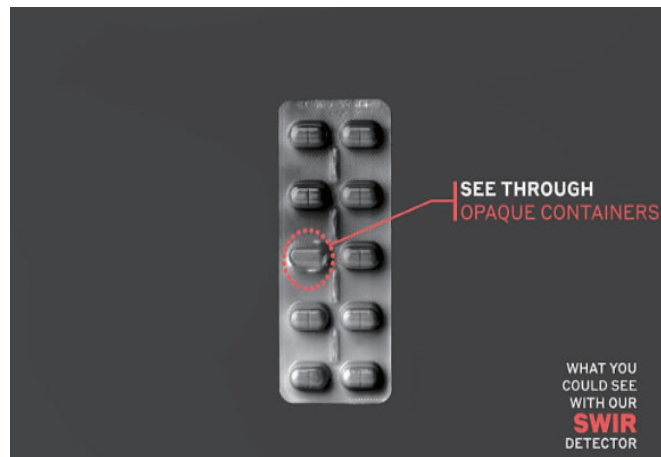
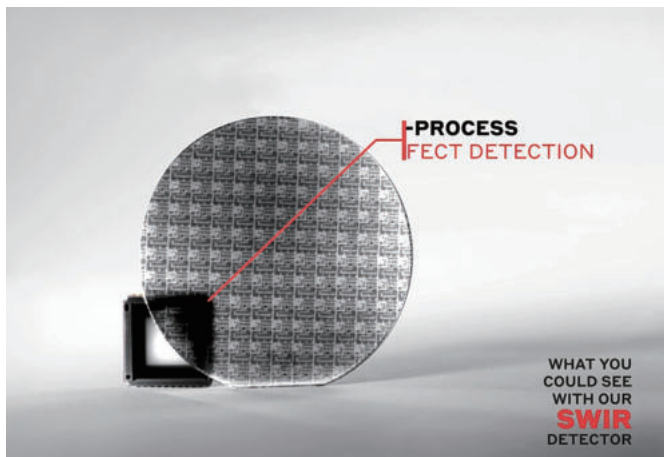
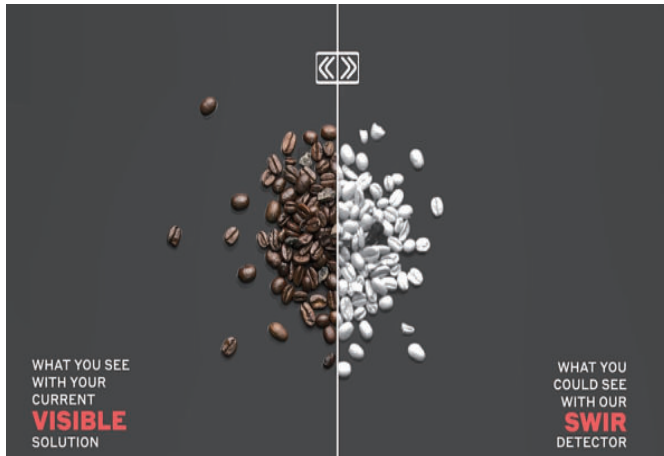
Model	Resolution	Frame Rate	Sensor	Pixel size	Wavelength
PA320F30N	320x256	30fps	Area InGaAs Non-TEC	30um	0.9~1.7um

SWIR Camera

SWIR Camera



Model	Resolution	Frame Rate	Sensor	Pixel size	Wavelength	Interface
PA320F100NCL	320x256	100fps	Area InGaAs Non-TEC	30um	0.9~1.7um	Camera Link
PA320F300TCL	320x256	300fps	Area InGaAs Cooled TE0	30um	0.9~1.7um	Camera Link
PA640F100TCL	640x512	100fps	Area InGaAs Cooled TE0	25um	0.9~1.7um	Camera Link
PAs640F100NCL	640x512	100fps	Area InGaAs Non-TEC	15um	0.9~1.7um	Camera Link
PAs640F300NCL	640x512	300fps	Area InGaAs Non-TEC	15um	0.9~1.7um	Camera Link
PA1024L40	1024x1	40khz	Line InGaAs Non-TEC	12.5um	0.9~1.7um	Camera Link
PA2048L10	2048x1	10khz	Line InGaAs Non-TEC	12.5um	0.9~1.7um	Camera Link
PA320F300NGE	320x256	300fps	Area InGaAs Non-TEC	30um	0.9~1.7um	GigE Vision
PAs640F100NGE	640x512	100fps	Area InGaAs Non-TEC	15um	0.9~1.7um	GigE Vision



초분광 Hyperspectral Imaging

PAMINA(SWIR camera), Spectrograph(분광기), Portable Spectroscopic Analysis System, View & SDK 등의 제품이 준비되어 있으며, 이들을 조합하여 시스템을 만들어서 분광 영상 데이터를 획득할 수 있습니다. 이 모든 제품은 당사가 자체 개발한 제품입니다.

초분광은 의료, 환경, 국방, 지질자원, 우주항공, 식품, 농수산물, 농업, 임업, 물리, 화학 등의 분야에서 활발히 사용됩니다.



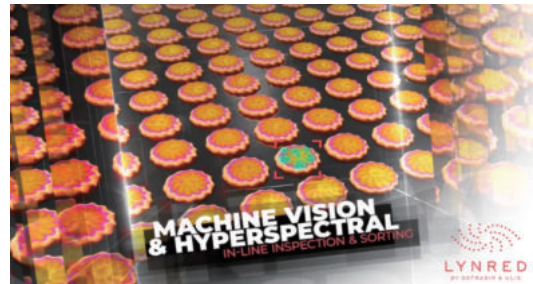
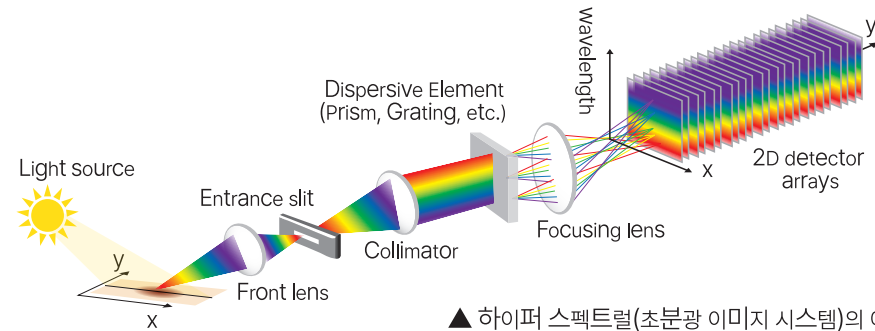
Camera

Model	Resolution	Frame Rate	Sensor	Pixel size	Wavelength	Interface
PA320F100NCL	320x256	100fps	Area InGaAs Non-TEC	30um	0.9~1.7um	Camera Link
PA320F300TCL	320x256	300fps	Area InGaAs Cooled TE0	30um	0.9~1.7um	Camera Link
PA640F100TCL	640x512	100fps	Area InGaAs Cooled TE0	25um	0.9~1.7um	Camera Link
PAs640F100NCL	640x512	100fps	Area InGaAs Non-TEC	15um	0.9~1.7um	Camera Link
PAs640F300NCL	640x512	300fps	Area InGaAs Non-TEC	15um	0.9~1.7um	Camera Link
PAs640F100NGE	640x512	100fps	Area InGaAs Non-TEC	15um	0.9~1.7um	GigE Vision

Spectrograph(분광기)



Parameter	OHSI-SWT1
Spectral range	900-1700nm
Dispersion	110nm/mm
Spectral resolution	5nm with 30um slit
Image size	Max. 7.68(spectral)X14.2(spatial)mm
Spatial resolution	RMS spot radius $\leq 15\mu$
Bending of spectral lines across spatial axis	Smile $< 5\mu$



OzHSILAB - 초분광 데이터 수집 소프트웨어

-
- The figure consists of two side-by-side screenshots of the OZRAY software interface. The left screenshot shows the 'OZRAY' main window with a 3D visualization of a fish's body shape, overlaid with a yellow line representing the body profile. The right screenshot shows the 'OZRAY' main window with a 3D visualization of a fish's body shape, overlaid with a yellow line representing the body profile. Both screenshots show various control panels and data fields.

초분광 장치 구성



- 초분광 장치 : 초분광 카메라(HSI) + RGB 카메라 + 분광기 + SWIR 렌즈 + 할로겐 돔 조명 + 스테이지 + 모터 (커스터마이징 가능)
- 파장 대역 : 0.9~1.7um (320 or 640 라인을 256개 이상의 파장 대역으로 분광)
- 촬영 방식 : Pushbroom (라인스캔)
- 어플리케이션 : 수산물의 신선도, 과일의 당분 및 신선도, 고춧가루의 매운맛 정도, 단백질 함유량, 플라스틱 분류, 이물질 검사 등 다양한 분야에서 활용 가능합니다.
- 위 사진은 포터블 장치로 RGB 카메라가 포함되어 있지 않습니다. 기구 변경하여 RGB 카메라 추가 가능합니다.

Machine Vision

POLLUX Series : CMOS Area Scan Camera



Model	Resolution	Frame Rate	Sensor	Sensor size	Pixel size	Interface
PX01M90MGE	1280x1024	30fps	OnSemi, Mono	1/2"	4.8um	GigE Vision
PX05M23MGE	2448x2048	23.5fps	Sony, Mono	2/3"	3.45um	GigE Vision
PXe12M63MCL	4096x3072	63fps	EMRALD, Mono	14.34mm	2.8um	Camera Link
PXe12M63CCL	4096x3072	63fps	EMRALD, Color	14.34mm	2.8um	Camera Link
PXe16M47MCL	4096x4096	47fps	EMRALD, Mono	16.22mm	2.8um	Camera Link
PXe16M47CCL	4096x4096	47fps	EMRALD, Color	16.22mm	2.8um	Camera Link
PXg25M91MCP	5120x5120	91fps	GPIXEL, Mono	18.1mm	2.5um	CoaxPress
PX50M30MCP	7920x6004	30fps	CMOSIS, Mono	45.7mm	4.6um	CoaxPress





ZEBRA – MATROX (Frame Grabber & MIL S/W)

CXP Frame Grabber

Model	Slot	Bandwidth	Memory	Connector	Interface
RAP 4G 4C12 DF	PCIe 3.1x8	12.5Gbps	4GB	HD BNC	CXP-12 CoaXPress
RAP 4G 4C6 DF	PCIe 3.1x8	12.5Gbps	4GB	HD BNC	CXP-12 CoaXPress
RAP 8G 4C12 P602	PCIe 3.1x8	12.5Gbps	8GB	HD BNC	CXP-12 CoaXPress
RAP 8G 4C12 P352	PCIe 3.1x8	12.5Gbps	8GB	HD BNC	CXP-12 CoaXPress
RAP 4G 4C12 DF	PCIe 3.1x8	12.5Gbps	4GB	HD BNC	CXP-12 CoaXPress
RAP 4G 4C6	PCIe 3.1x8	6.25Gbps	4GB	HD BNC	CXP-6 CoaXPress
RAP 2G 2C12	PCIe 3.1x4	12.5Gbps	2GB	HD BNC	CXP-12 CoaXPress
RAP 1G 1C12	PCIe 3.1x4	12.5Gbps	1GB	HD BNC	CXP-12 CoaXPress

Camera Link Frame Grabber

Model	Slot	Bandwidth	Memory	Connector	Interface
RAD EV 1G CLDF	PCIe 2.1x8	85MHz	1GB	HDR26	Dual Full CL
RAD EV 1G CLOB	PCIe 2.1x8	85MHz	1GB	HDR26	Quad-Base CL
RAD EV 1G CLSF	PCIe 2.1x8	85MHz	1GB	HDR26	Single-Full CL
RAD EV 1G CLDB	PCIe 2.1x8	85MHz	1GB	HDR26	Dual-Base CL
RAD EV 5M CLSF	PCIe 2.1x4	85MHz	512MB	HDR26	Single-Full CL

Machine Vision

Model	Slot	Bandwidth	Memory	Connector	Interface
RAD EV 5M CLDB	PCIe 2.1x4	85MHz	512MB	HDR26	Dual-Base CL
RAP 4G CL DF P325	PCIe 2.1x8	85MHz	4GB	HDR26	Dual Full CL
RAP 4G CL QB P325	PCIe 2.1x8	85MHz	4GB	HDR26	Quad-Base CL
RAP 4G CL SF P325	PCIe 2.1x8	85MHz	4GB	HDR26	Single-Full CL
RAP 4G CL DB P325	PCIe 2.1x8	85MHz	4GB	HDR26	Dual-Base CL

GigE Frame Grabber

Model	Slot	Bandwidth	Memory	Connector	Interface
CON P T 4	PCIe 2.1x4	1000Mbps	-	RJ-45	GigE Quad (TOE)
CON P T 2	PCIe 2.1x4	1000Mbps	-	RJ-45	GigE Dual (TOE)
CON P 4	PCIe 2.1x4	1000Mbps	-	RJ-45	GigE Quad
CON P 2	PCIe 2.1x4	1000Mbps	-	RJ-45	GigE Dual



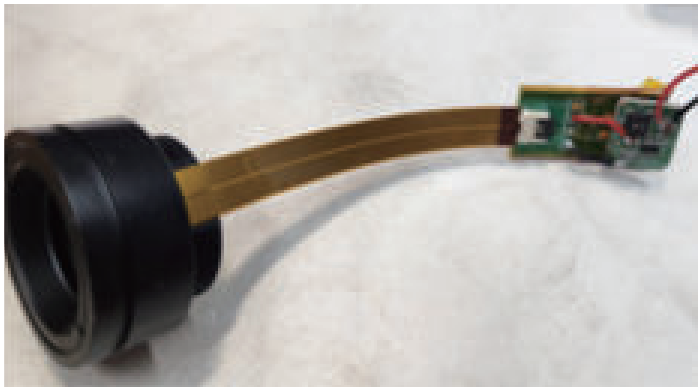
Imaging Library – MIL

주문 코드 알림												통 칭	명 칭	세부내용
MXRT	X	X	X	X	X	X	X	X	0	0	X			
MXRT	A	0	0	0	0	0	0	0	0	0	0	A키	Analysis	이미지프로세싱, Blob, Bead, 2D Calibration, measurment
MXRT	M	0	0	0	0	0	0	0	0	0	0	M키	Machine Vision	A키 + Pattern Matching, 2D Calibration, measurement
MXRT	0	I	0	0	0	0	0	0	0	0	0	I키	Identification	OCR, Code Reader(1D,2D barcode)
MXRT	0	C	0	0	0	0	0	0	0	0	0	C키	String Reader	String Reader
MXRT	0	2	0	0	0	0	0	0	0	0	0	2키(I+C조합키)	Identification + String Reader	Identification + String Reader
MXRT	0	0	J	0	0	0	0	0	0	0	0	J키	Image Codec	이미징 압축 JPEG,JPEG2000,H.264 codec
MXRT	0	0	T	0	0	0	0	0	0	0	0	T키	GPU Processing	GPU 프로세싱
MXRT	0	0	B	0	0	0	0	0	0	0	0	B키(J+T조합키)	Image Codec+GPU Processing	이미징 압축과 GPU 프로세싱 조합
MXRT	0	0	0	G	0	0	0	0	0	0	0	G키	GMF(Geometric model Finder)	모델파인더
MXRT	0	0	0	E	0	0	0	0	0	0	0	E키	Edge Finder	엣지파인더
MXRT	0	0	0	2	0	0	0	0	0	0	0	2키(G+E조합키)	GMF+Edge Finder	모델파인더와 엣지파인더 조합
MXRT	0	0	0	0	S	0	0	0	0	0	0	S키	Third Party Driver(GigE, 1394,U3V)	GigE,1394,USB3카메라 영상획득을 지원하는 MIL 서드파티드라이버
MXRT	0	0	0	0	D	0	0	0	0	0	0	D키	DMIL(Distributed MIL)	MIL 분산처리
MXRT	0	0	0	0	B	0	0	0	0	0	0	B키(S+D조합키)	Third Party Driver+DMIL	MIL 서드파티드라이버와 분산처리 조합
MXRT	0	0	0	0	0	R	0	0	0	0	0	R키	Registration	레지스트레이션 (영상병합도구)
MXRT	0	0	0	0	0	3	0	0	0	0	0	3키	3D Calibration,reconstruction	3D Calibration과 3D 영상 재구성 툴
MXRT	0	0	0	0	0	2	0	0	0	0	0	2키(R+3조합키)	Registration+3D Cal.	레지스트레이션과 3D 영상재구성 툴의 조합
MXRT	0	0	0	0	0	0	Y	0	0	0	0	Y키	Metrology	메트롤로지(기하학적 측정도구)
MXRT	0	0	0	0	0	0	Q	0	0	0	0	Q키	Color Analysis	컬러분석도구
MXRT	0	0	0	0	0	0	B	0	0	0	0	B키(Y+Q조합키)	Metrology+Color Analysis	메트롤로지와 컬러분석도구의 조합
MXRT	M	0	0	0	0	0	0	Z	0	0	0	Z키	Robot communication	로봇과통신지원
MXRT	M	0	0	0	0	0	0	N	0	0	0	N키	Classification Package	Classification Package
MXRT	M	0	0	0	0	0	0	2	0	0	0	2키(Z+N조합키)	Industrial and Robot + Classification Package	Industrial and Robot + Classification Package
MXRT	M	0	0	0	0	0	0	0	0	0	U	USB키	Finger Printer	H/W License Key

Lens

Heating Lens for Automotive Camera

열선이 있는 렌즈입니다. 혹한기나 우천시에 사용됩니다.



Optical specifications

Focal length	8.0 mm
Aperture-based f-number	f/1.10
Maximum image circle	8.7 mm
Waveband	8~12 um
Focus range	4.8 M to infinity
Distortion	< 16 % (384×288, 17 um)
Transmittance(average@waveband)	< 95 % (AR coating) < 90 % (DLC coating)
Relative illumination	< 90

LWIR Lens : VIEWNYX

Model	Focal Length	f/N	FOV (HxVxD 17um)	waveband
VN4.012	4mm	f/1.18	90x67.7x112.6	8~12um
VN4.314	4.3mm	f/1.39	90x65.2x120	8~12um
VN4.710	4.7mm	f/1.05	62x44x83	8~12um
VN5.411	5.4mm	f/1.14	41.5x30.9x52.4	8~12um
VN6.210	6.2mm	f/1.05	62.5x46x80.5	8~12um
VN6.413	6.4mm	f/1.28		8~12um
VN6.713	6.7mm	f/1.3	57x42.3x72.5	8~12um

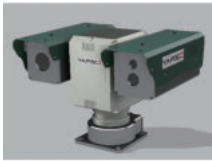
Model	Focal Length	f/N	FOV (HxVxD 17um)	waveband
VN8.010	8mm	f/1.1	48.6x35.8x62.5	8~12um
VN1210	12mm	f/1.0	30.6x22.6x37.2	8~12um
VN1510	15mm	f/1.03	24.5x18.5x30.4	8~12um
VN1810	18mm	f/1.0	20x15x25	8~12um
VN1910	19mm	f/1.03	19.4x14.6x24.2	8~12um
VN2510	25mm	f/1.0	14.8x11.2x18.5	8~12um

LWIR Lens : OPHIR

Model	Focal Length	f/N	WFOV	NFOV
680164	15-60mm	f/1.4	15mm	60mm
680386	15-75mm	f/1.2	15mm	75mm
680090	15-100mm	f/1.4	15mm	100mm
680151	30-100mm	f/1.6	30mm	100mm
680320	26-105mm	f/1.6	26mm	105mm
680119	25-150mm	f/1.4	25mm	150mm
680157	25-225mm	f/1.5	25mm	225mm
680264	40-300mm	f/1.5	40mm	300mm

Lens

HOUSING & P/T



※ 카메라, 하우징 등 커스터마이징 가능

Model	Pan/Tilt	Speed / Angle	Thermal Sensor	Thermal Lens	Spectral Range	Color CMOS Sensor	Color CMOS Lens
OZLV384L25225	o	Pan 0.1~60°, Tilt 0.1~30° / Pan 360°, Tilt +20° ~ -70°	384x288 / 30fps	25~225mm(9x) f/1.5 Motorized Zoom / A.F	8~14um (LWIR)	1920x1080 / 30fps	36x Day & Night Zoom Lens, 6-216mm(f/1.5-f/4.8)
OZLV640L25225	o	Pan 0.1~60°, Tilt 0.1~30° / Pan 360°, Tilt +20° ~ -70°	640x480 / 30fps	25~225mm(9x) f/1.5 Motorized Zoom / A.F	8~14um (LWIR)	1920x1080 / 30fps	36x Day & Night Zoom Lens, 6-216mm(f/1.5-f/4.8)
OZLV384SL128	o	Pan 0.1~60°, Tilt 0.1~30° / Pan 360°, Tilt +20° ~ -70°	384x288 / 30fps	12.8mm f/1.4 Fixed Athermalized	8~14um (LWIR)	1920x1080 / 30fps	12x Day & Night Zoom Lens, 7-84mm(f/1.5-f/1.9)
OZLV640SL128	o	Pan 0.1~60°, Tilt 0.1~30° / Pan 360°, Tilt +20° ~ -70°	640x480 / 30fps	12.8mm f/1.4 Fixed Athermalized	8~14um (LWIR)	1920x1080 / 30fps	12x Day & Night Zoom Lens, 7-84mm(f/1.5-f/1.9)
OZSW320L16187	o	Pan 0.1~60°, Tilt 0.1~30° / Pan 360°, Tilt +20° ~ -70°	640x512 / 30fps	16-187mm(11.7x) f/2.7 Motorized Zoom / A.F	0.9~1.7um (SWIR)	N/A	N/A
OZTS384SL12.8	o / x	Pan 180°, Tilt 120° (step 0.1°) / Pan 360°, Tilt -90° ~ +90°	384x288 / 30fps	12.8mm fixed	8~14um (LWIR)	N/A	N/A
OZTS640SL12.8	o / x	Pan 180°, Tilt 120° (step 0.1°) / Pan 360°, Tilt -90° ~ +90°	640x512 / 30fps	12.8mm fixed	8~14um (LWIR)	N/A	N/A
OZTS384DL8	o / x	Pan 180°, Tilt 120° (step 0.1°) / Pan 360°, Tilt -90° ~ +90°	384x288 / 30fps	8mm fixed	8~14um (LWIR)	1920x1080 / 30fps	1/2.7"
OZTS640DL8	o / x	Pan 180°, Tilt 120° (step 0.1°) / Pan 360°, Tilt -90° ~ +90°	640x512 / 30fps	8mm fixed	8~14um (LWIR)	1920x1080 / 30fps	1/2.7"

Machine Vision Lens

Chiopt – FA series

Model	Magnification	Focal Length	WD	F/N	Image Circle	Mount
FK2502A	0.028 - 0.253 X	25 mm	INF	F1.4	2/3	C-Mount
FA5016M	0.01 - 0.179 X	50 mm	INF	F2.8	1.1	C-Mount
FK1602A	0.018 - 0.145 X	16 mm	INF	F1.4	2/3	C-Mount
FK0815A	0.010 - 0.064 X	8 mm	INF	F1.4	1.1	C-Mount
FA3516M	0.0069 - 0.1805 X	35 mm	INF	F2.8	1.1	C-Mount
FA5025A	0.0516 - 0.185 X	50 mm	INF	F2.8	1.1	C-Mount
FA2516M	0.005 - 0.221 X	25 mm	INF	F2.8	1.1	C-Mount
FA3525A	0.0069 - 0.2313 X	35 mm	INF	F2.8	1.1	C-Mount
FA1616M	0.0032 - 0.148 X	16 mm	INF	F2.8	1.1	C-Mount
FA2525A	0.005 - 0.24 X	25 mm	INF	F2.8	1.1	C-Mount
FA1216M	0.002 - 0.103 X	12 mm	INF	F2.8	1.1	C-Mount
FA3502M	0.037 - 0.213 X	35 mm	INF	F1.4	2/3	C-Mount
FA1625A	0.003 - 0.132 X	16 mm	INF	F2.8	1.1	C-Mount
FA1225A	0.0025 - 0.1055 X	12 mm	INF	F2.8	1.1	C-Mount

Model	Magnification	Focal Length	WD	F/N	Image Circle	Mount
FA1602M	0.018 - 0.145 X	16 mm	INF	F1.4	2/3	C-Mount
FA0825A	0.0016 - 0.0696 X	8 mm	INF	F2.8	1.1	C-Mount
FA5002A	0.025 - 0.177 X	50 mm	INF	F1.4	2/3	C-Mount
FA5011A	0.053 - 0.192 X	50 mm	INF	F2.4	1/1.7	C-Mount
FA3502A	0.037 - 0.213 X	35 mm	INF	F1.4	2/3	C-Mount
FA3511A	0.036 - 0.279 X	35 mm	INF	F2.4	1/1.7	C-Mount
FA2502A	0.028 - 0.253 X	25 mm	INF	F1.4	2/3	C-Mount
FA1602A	0.018 - 0.145 X	16 mm	INF	F1.4	2/3	C-Mount
FA1202A	0.014 - 0.077 X	12 mm	INF	F1.4	2/3	C-Mount
FA2511A	0.025 - 0.284 X	25 mm	INF	F2.4	1/1.7	C-Mount
FA0802A	0.009 - 0.075 X	8 mm	INF	F1.4	2/3	C-Mount
FA1611A	0.016 - 0.138 X	16 mm	INF	F2.4	1/1.7	C-Mount
FA1211A	0.012 - 0.106 X	12 mm	INF	F2.4	1/1.7	C-Mount
FA0811A	0.008 - 0.07 X	8 mm	INF	F2.4	1/1.7	C-Mount
FA0611A	0.006 - 0.166 X	6 mm	INF	F2.4	1/1.7	C-Mount

Lens

Model	Magnification	Focal Length	WD	F/N	Image Circle	Mount
FA5010A	0.011 - 0.188 X	50 mm	INF	F2.8	2/3	C-Mount
FA3510A	0.007 - 0.347 X	35 mm	INF	F2.8	2/3	C-Mount
FA2510A	0.005 - 0.246 X	25 mm	INF	F2.8	2/3	C-Mount
FA1610A	0.0032 - 0.15 X	16 mm	INF	F2.8	2/3	C-Mount
FA1210A	0.002 - 0.109 X	12 mm	INF	F2.8	2/3	C-Mount
FA0810A	0.002 - 0.074 X	8 mm	INF	F2.8	2/3	C-Mount
FA5001C	0.043 - 0.196 X	50 mm	INF	F2.8	1/1.8	C-Mount
FA3501C	0.036 - 0.193 X	35 mm	INF	F2.2	1/1.8	C-Mount
FA2501C	0.025 - 0.296 X	25 mm	INF	F2.2	1/1.8	C-Mount
FA1601C	0.018 - 0.162 X	16 mm	INF	F2.2	1/1.8	C-Mount
FA1201C	0.013 - 0.113 X	12 mm	INF	F2.2	1/1.8	C-Mount
FA0801C	0.009 - 0.076 X	8 mm	INF	F2.2	1/1.8	C-Mount
FA0601C	0.007 - 0.058 X	6 mm	INF	F2.2	1/1.8	C-Mount
FA0401C	0.005 - 0.037 X	4 mm	INF	F2.0	1/1.8	C-Mount

Chiopt – Telecentric series

Model	Magnification	Focal Length	WD	F/N	Image Circle	Mount
MV1105A	0.5 X	-	110 mm	F9.3	2/3	C-Mount
MV1116A	6 X	-	110 mm	F35	2/3	C-Mount
MV1112A	2 X	-	110 mm	F13.6	2/3	C-Mount
MV1114A	6 X	-	110 mm	F22	2/3	C-Mount

Model	Magnification	Focal Length	WD	F/N	Image Circle	Mount
HC7505A	0.055 - 0.115 X	75 mm	INF	F1.8	1	C-Mount
HC5005A	0.05 - 0.163 X	50 mm	INF	F1.6	1	C-Mount
HC3505A	0.036 - 0.244 X	35 mm	INF	F1.4	1	C-Mount
HC1605A	0.016 - 0.146 X	16 mm	INF	F1.4	1	C-Mount
HC2505A	0.0325 - 0.27 X	25 mm	INF	F1.4	1	C-Mount
HC1205A	0.0136 - 0.0106 X	12.5 mm	INF	F1.4	1	C-Mount
FA7515A	0.055 - 0.115 X	75 mm	INF	F1.8	1.1	C-Mount
FA5015A	0.0516 - 0.185 X	50 mm	INF	F1.6	1.1	C-Mount
FA3515A	0.036 - 0.244 X	35 mm	INF	F1.4	1.1	C-Mount
FA2515A	0.0325 - 0.27 X	25 mm	INF	F1.4	1.1	C-Mount
FA1615A	0.02 - 0.139 X	16 mm	INF	F1.4	1.1	C-Mount
FA1215A	0.0155 - 0.109 X	12 mm	INF	F1.4	1.1	C-Mount
FA0815A	0.01 - 0.064 X	8 mm	INF	F1.4	1.1	C-Mount
FA0615A	0.00757 - 0.049 X	6 mm	INF	F1.8	1.1	C-Mount

Model	Magnification	Focal Length	WD	F/N	Image Circle	Mount
MV1111A	1 X	-	110 mm	F11	2/3	C-Mount
TC0503A	0.367 X	-	184.4 mm	F5.9	4/3	C-Mount
TC0502A	0.22 X	-	167 mm	F6.8	D	C-Mount
TC0501A	0.188 X	-	167 mm	F6.8	2/3	C-Mount

SWIR Lens

Computar

Model	Focal Length	F/n	Image Circle	Waveband	Mount
M1614-SW	16mm	F/1.4	2/3"	800~1700nm	C
M2514-SW	25mm	F/1.4	2/3"	800~1700nm	C
M3514-SW	35mm	F/1.4	2/3"	800~1700nm	C
M5018-SW	50mm	F/1.8	2/3"	800~1700nm	C
H0514-VSW	5mm	F/1.4	2/3"	400~1700nm	C
M0814-VSW	8mm	F/1.4	2/3"	400~1700nm	C
M1214-VSW	12mm	F/1.4	2/3"	400~1700nm	C
M1614-VSW	16mm	F/1.4	2/3"	400~1700nm	C
M2514-VSW	25mm	F/1.4	2/3"	400~1700nm	C
M3514-VSW	35mm	F/1.4	2/3"	400~1700nm	C
M5018-VSW	50mm	F/1.8	2/3"	400~1700nm	C
M0818-APVSW	8mm	F/1.8	2/3"	400~1700nm	C
M1218-APVSW	12mm	F/1.8	2/3"	400~1700nm	C
M1618-APVSW	16mm	F/1.8	2/3"	400~1700nm	C
M2518-APVSW	25mm	F/1.8	2/3"	400~1700nm	C

Myutron Lens

Model	Focal Length	F/n	Image Circle	Waveband	Mount
HS0619V-SW	6mm		1"	950~1800nm	C
H0818V-SW	8mm		1"	950~1800nm	C
H1214V-SW	12.5mm		1"	950~1800nm	C
H1614V-SW	16mm		1"	950~1800nm	C
H2514V-SW	25mm		1"	950~1800nm	C
H3516V-SW	35mm		1.1"	950~1800nm	C
H5016V-SW	50mm		1.1"	950~1800nm	C
H7520V-SW	75mm		1.1"	950~1800nm	C
HS10028V-SW	100mm		1.1"	950~1800nm	C

Lens

SWIR Telecentric Lens – Myutron

Model	배율	WD	Image Circle	Waveband	Mount
FTV05C-110SW	0.5X	116.4mm	1.1"	950nm~1800nm	C
FTV07C-110SW	0.7X	116mm	1.1"	950nm~1800nm	C
FTV10C-110SW	1.0X	110mm	1.1"	950nm~1800nm	C
FTV20C-110SW	2.0X	110.2mm	1.1"	950nm~1800nm	C
FTV30C-110SW	3.0X	110.3mm	1.1"	950nm~1800nm	C
FTV40C-110SW	4.0X	110mm	1.1"	950nm~1800nm	C
FTV10-110SW	1.0X	110mm	1.1"	950nm~1800nm	C
FTV20-110SW	2.0X	110.2mm	1.1"	950nm~1800nm	C

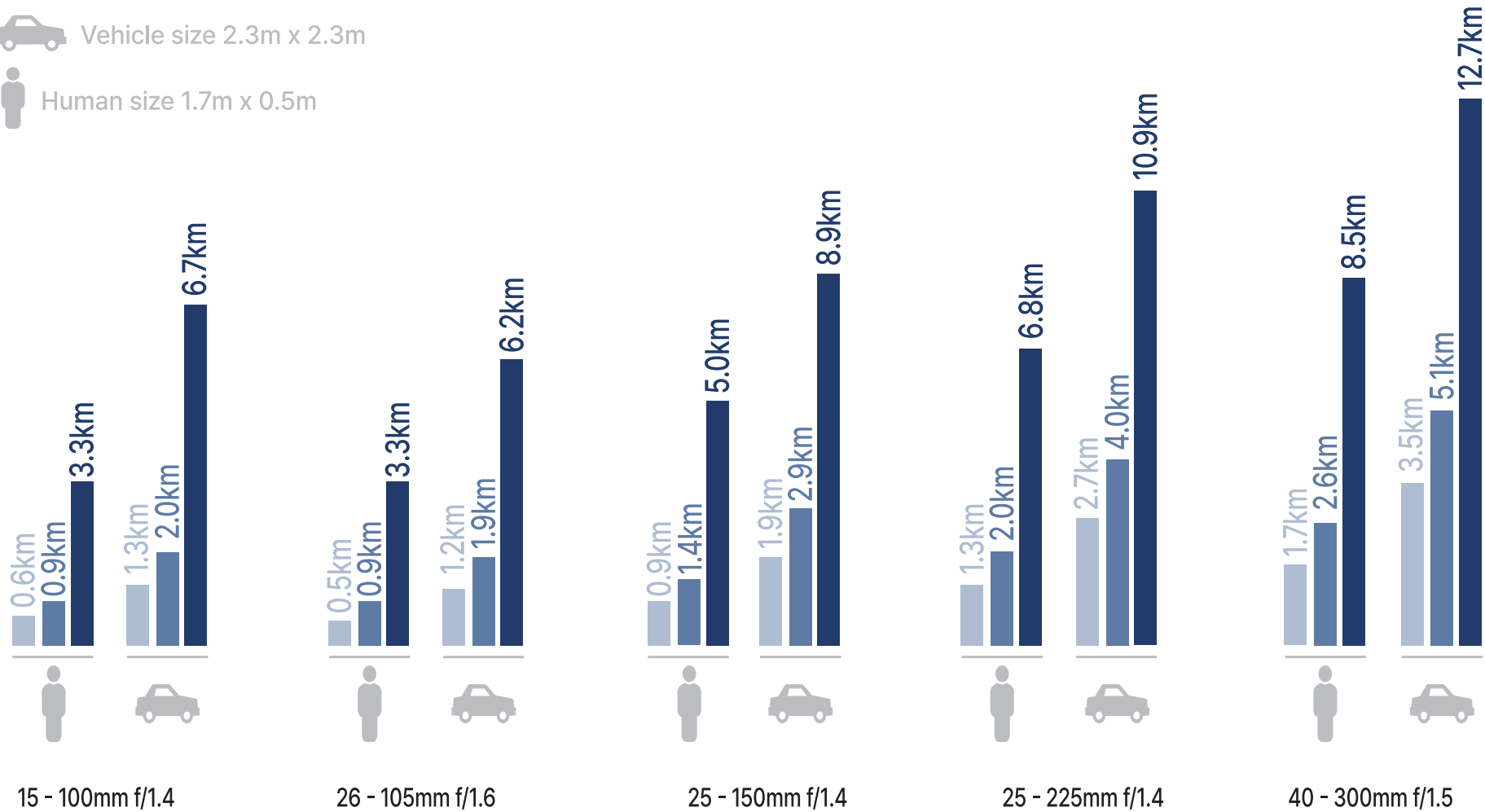
SWIR 대물렌즈 – Mitutoyo

Model	NA	WD	Waveband
M Plan Apo NIR 5x	0.14	37.5mm	400~1800nm
M Plan Apo NIR 10x	0.26	31mm	400~1800nm
M Plan Apo NIR 20x	0.4	20mm	400~1800nm
M Plan Apo NIR 50x	0.42	17mm	400~1800nm
M Plan Apo NIR 100x	0.5	12mm	400~1800nm
M Plan Apo NIR HR 50x	0.65	10mm	400~1800nm
M Plan Apo NIR HR 100x	0.7	10mm	400~1800nm
M Plan Apo NIR B 20x	0.4	25.5mm	400~1800nm
M Plan Apo NIR B 50x	0.42	25.5mm	400~1800nm

Uncooled LWIR, 17 μ m pixel size detector*

 Vehicle size 2.3m x 2.3m

 Human size 1.7m x 0.5m



 Identification
 Recognition
 Detection

Detection: an object is present – 2 pixels on target

Recognition: discern the type of object, a human vs. a vehicle – 8 pixels on target

Identification: discern specific objects, a man vs. a woman, a car model – 12.8 pixels on target

*기상 환경 등에 따라 거리가 상이할 수 있습니다.



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