

Thermal cameras

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Thermal imaging from the experts

Whether you are an OEM looking to develop a thermal-imaging camera or an integrator looking to protect a strategic asset, we have the expertise and product portfolio to help you see the unseen.

Trust our technical experts for dependable support

With 20 years' experience supporting imaging applications, Acal BFi are well positioned to help you choose the right thermal or visible solution and deliver a high-quality, cost-effective solution.

Custom thermal cameras from Acal BFi

Based in Gröbenzell (near Munich, Germany), and opened in 2014, Acal BFi's Imaging Competence Centre (ICC) has the capability to build custom thermal cameras on demand, by matching selected uncooled thermal cores (320 or 640 resolution) with the appropriate lens required by the application (like a thermal fixed focal or continuous zoom) and calibrating the combination via adequate blackbodies and collimators.

These cameras can be supplied either as an OEM module or integrated in a custom environmental housing (such as rugged industrial housing or stainless steel housing).



Understanding your needs

AcAl BFi provide design, engineering and after-sales support to OEM customers operating in the imaging market. Our experts have been successfully supporting customers to deliver solutions they can trust for over 20 years.

We can support you from development to manufacture, ensuring you have everything you need, when you need it. Our customer service begins with understanding your application and specific requirements so we can advise you on the best camera modules and help you plan the design and test process. We also offer equipment loans and field demonstrations to ensure the recommendations are right for you.

Expert support

- **Liaising with manufacturers**
Saving you time and working to ensure your requirements are met.
- **Supplying key accessories**
Delivering all of the complementary components your product needs.
- **State-of-the-art logistics**
Including buffer stocking, kanban and just-in-time logistics models to suit your inventory needs.



Key partners overview

AcAl BFi have chosen to work with the leading manufacturers in their field, offering you a complete solution for all your imaging needs.



DRS Technologies provide world-class leading thermal imaging systems. The Tamarisk® miniature uncooled microbolometer camera modules, 320 or 640 resolution with 17 micron pitch, are optimised for OEM applications in the industrial, security and military markets.



General Dynamics Global Imaging Technology manufacture long-and extreme-long-range thermal cameras, imagers and multi-sensor systems delivering clarity, accuracy and reliability for mission-critical applications.



Hitachi develop and manufacture an extensive range of specialised solutions for surveillance, industrial and medical applications. Their portfolio includes monochrome and colour HD CCTV cameras.



IR Zoom specialise in providing innovative infrared zoom lenses. Their portfolio delivers superior performance and reliability, with availability on short lead times.



IRC manufacture custom, high-performance infrared imaging systems for the most demanding scientific, industrial and military applications.



L3 provide a range of electronic systems used in military and commercial applications, including powerful handheld infrared thermal imaging cameras.



Pentax are recognised globally for technically superior imaging systems. They deliver long-range CCTV zoom products that are used for security, factory automation, safety and traffic-monitoring applications.



Photonis manufacture innovative low light and intensified visible imaging products for the security and military markets across the globe.



Silent Sentinel are a leading manufacturer of standard and customised surveillance and security systems, including ruggedised thermal-imaging solutions.



SRI International manufacture the Acadia video processor series, from SRI International, gives users the ability to process complex information from full motion video and is used in law enforcement, surveillance and unmanned vehicles.





1. Surveillance thermal cameras – uncooled

Manufacturer		Acal Bfi	Acal Bfi	SILENT SENTINEL	SILENT SENTINEL
Model		CCTi-300B-01	CCTi-600B-01	HT01	TMD
THERMAL CAMERAS for Security & Surveillance					
		Type	Uncooled LWIR (8-14μ)	Uncooled LWIR (8-14μ)	Uncooled LWIR (8-14μ)
Thermal Imager	Detector	Microbolometer ASi 25/35μ pitch	Microbolometer ASi 17μ pitch	Microbolometer VOx 17μ pitch	Microbolometer VOx 17μ pitch
	Resolution	384x288 pixels	640x480 pixels	320x240 pixels	320x240 pixels
	NETD	<80mK @ F/1.0	<60mK @ F/1.0	<50mK @ F/1.0	<50mK @ F/1.0
	Lens Type	Athermal	Athermal	Athermal	Athermal
	Focus	Manual focus	Manual focus	Manual focus	Fixed focus
	OPTION TI-1	9mm F/1.1 HFOV 90°	9mm F/1.1 HFOV 70°	3.8mm F/1.4 HFOV 90°	3.8mm F/1.4 HFOV 90°
	OPTION TI-2	9mm F/1.1 HFOV 60°	18mm F/1.1 HFOV 35°	7.5mm F/1.2 HFOV 40°	7.5mm F/1.2 HFOV 40°
	OPTION TI-3	18mm F/1.1 HFOV 30°	37mm F/1.1 HFOV 17°	13mm F/1.0 HFOV 24°	13mm F/1.0 HFOV 24°
	OPTION TI-4	37mm F/1.1 HFOV 15°	50mm F/1.1 HFOV 12°	19mm F/1.2 HFOV 16°	19mm F/1.2 HFOV 16°
	OPTION TI-5	50mm F/1.1 HFOV 11°		35mm F/1.2 HFOV 9°	
OPTION TI-6			640x480 version available	640x480 version available	
Packaging	Environmental rating	IP66	IP66	IP67	IP67
	Operation temperature	-25°C to +50°C	-25°C to +50°C	-40°C to +60°C	-40°C to +60°C
	Weight	3.4 kg	3.4 kg	< 1 kg	< 1 kg
	Size LxWxH	362 x 140 x 145 mm	362 x 140 x 145 mm	60m L x 65 mm Diam (w/o sunshield)	174m H x 140 mm Diam
	Connector	Sealing gland	Sealing gland	Mill-connector	Flying leads
Control	Color	Grey	Grey	Black or White	Black or White
	Interface	IP or RS485	IP or RS485	RS232	RS232
	Protocol	Pelco D/P	Pelco D/P	Pelco D	Pelco D
	Power	12 VDC, 24 VAC	12 VDC, 24 VAC	12-24 VDC, < Watt	12-24 VDC, < Watt
Video Outputs	Video 1	Analog PAL 25Hz	Analog PAL 25Hz	Analog PAL 25Hz or 9Hz	Analog PAL 25Hz or 9Hz
	Video 2	IP	IP		
Export Status		No License Required (inside EU)	No License Required (inside EU)	US DoC (EAR)	US DoC (EAR)
Thermal Imager DRI Ranges man-size target Detection Recognition Identification		D / R / I	D / R / I	D / R / I	D / R / I
	OPTION TI-1	160 / 40 / 20m	320 / 100 / 50m	130 / 40 / 25m	130 / 40 / 25m
	OPTION TI-2	230 / 60 / 30m	600 / 160 / 110m	250 / 70 / 40m	250 / 70 / 40m
	OPTION TI-3	450 / 110 / 60m	1300 / 350 / 170m	480 / 115 / 80m	480 / 115 / 80m
	OPTION TI-4	900 / 230 / 110m	1800 / 450 / 220m	700 / 170 / 120m	700 / 170 / 120m
	OPTION TI-5	1250 / 310 / 160m		1300 / 350 / 170m	
	OPTION TI-6				


1. Surveillance thermal cameras – cooled

Manufacturer		GENERAL DYNAMICS	G5 Infrared	GENERAL DYNAMICS	GENERAL DYNAMICS
Model		Z500	550CZ-18	Z750	Z1010
THERMAL CAMERAS for very long range surveillance					
Thermal Imager	Type	Cooled MWIR (3-5μ)	Cooled MWIR (3-5μ)	Cooled MWIR (3-5μ)	Cooled MWIR (3-5μ)
	Detector	InSb 320x240 pixels 30μ pitch	640x512 pixels 15μ pitch	MCT 640x480 pixels 12μ pitch	MCT 640x480 pixels 12μ pitch
	NETD	<20mK	<20mK	<20mK	<20mK
	Lens Type	5X Continuous Zoom	18X Continuous Zoom	5X Continuous Zoom	4-FOV (discrete)
	F/N	F/4.0	F/4.0	F/4.0	F/4.0
	Focus	Motorized, Auto & Manual focus	Motorized, Auto & Manual focus	Motorized, Auto & Manual focus	Motorized, Auto & Manual focus
	Focal	100 to 500mm	30 to 550mm	150 to 750mm	95mm / 250mm / 500mm / 1000mm
	WFOV	5.5° x 4.1°	18.0° x 13.7°	2.9° x 2.2°	4.6° x 3.5°
Cooler	NFOV	1.1° x 0.8°	1.0° x 0.75°	0.6° x 0.44°	0.44° x 0.33°
	Cooler	rotary cooler	long life cooler (hot sensor)	long life cooler (hot sensor)	long life cooler (hot sensor)
	Cooler Warranty	the lesser of 1-year or 7,500 hrs use	2 years	the lesser of 2-years or 10,000 hrs use	the lesser of 2-years or 10,000 hrs use
	Maintenance in Europe	Yes	In process	No	No
Packaging	Environmental rating	IP67 - Marinized	IP67 - Marinized	IP67 - Marinized	IP67 - Marinized
	Sealing	sealed & dry nitrogen backfield	sealed & dry nitrogen backfield	sealed & dry nitrogen backfield	sealed & dry nitrogen backfield
	Operation temperature	-32°C to +60°C (heater inside)	-20°C to +60°C (heater inside)	-32°C to +60°C (heater inside)	-32°C to +60°C (heater inside)
	Weight	9 kg	6 kg	13.2 kg	19.1 kg
	Size LxWxH	610 x 180 x 180 mm	443 x 200 x 200 mm	737 x 250 x 250 mm	750 x 356 x 308 mm
	Connector	MIL-Connector (IP67)	MIL-Connector (IP67)	MIL-Connector (IP67)	MIL-Connector (IP67)
	Color	White or Sand	White	White or Sand	White or Sand
Control	Interface	Serial interface RS232 / RS422	Serial interface RS232 / RS422	Serial interface RS232 / RS422	Serial interface RS232 / RS422
	Protocol	TASS or GD protocol	TASS or G5 protocol	TASS or GD protocol	TASS or GD protocol
	Power	11-16 VDC, 18 Watts typ.	12 VDC, 20 Watts typ.	10.5-36 VDC, 30 Watts typ.	10.5-36 VDC, 30 Watts typ.
Video Outputs	Video 1	Analog PAL 25Hz	Analog PAL 25Hz	Analog PAL 25Hz	Analog PAL 25Hz
	Video 2				
Export Status		US DoS (ITAR)	US DoS (ITAR)	US DoS (ITAR)	US DoS (ITAR)
	Thermal Imager DRI Ranges	D / R / I	D / R / I	D / R / I	D / R / I
man-size target	Man-size target	14 / 5 / 2.5 km	18 / 10 / 4.5 km	25 / 15 / 7.5 km	37 / 20 / 10 km
	Vehicle target	35 / 20 / 10 km	38 / 22 / 11 km	40 / 20 / 12 km	50 / 25 / 15 km





1. Surveillance thermal cameras – Uncooled PTZ short and mid range

Manufacturer	Acal BFi	SILENT SENTINEL	Acal BFi	SILENT SENTINEL	
Model	CCTi-300P-01	OCULUS TI 320	CCTi-300P-02	OCULUS TI 640	
UNCOOLED THERMAL PTZ CAMERAS for short and mid range surveillance					
	Sensor	Uncooled LWIR (8-14μ) 384x288 pixels	Uncooled LWIR (8-14μ) 320x240 pixels	Uncooled LWIR (8-14μ) 384x288 pixels	Uncooled LWIR (8-14μ) 640x480 pixels
	Type	ASi 25μ pitch NETD <80mK	VOx 17μ pitch NETD <50mK @ F/1.0	ASi 25μ pitch NETD <80mK	VOx 17μ pitch NETD <50mK @ F/1.0
	Lens Type	Fixed Focus Lens - Athermal	Fixed Focus Lens - Athermal	Fixed Focus Lens - Athermal	Fixed Focus Lens - Athermal
	OPTION TI-1	9mm F/1.1 HFOV 60°	3.8mm F/1.4 HFOV 90°	9mm F/1.1 HFOV 60°	7.5mm F/1.2 HFOV 90°
	OPTION TI-2	18mm F/1.1 HFOV 30°	7.5mm F/1.2 HFOV 40°	18mm F/1.1 HFOV 30°	14.2mm F/1.2 HFOV 44°
	OPTION TI-3	37mm F/1.1 HFOV 15°	13mm F/1.0 HFOV 24°	37mm F/1.1 HFOV 15°	16.7mm F/1.2 HFOV 37°
	OPTION TI-4		19mm F/1.2 HFOV 16°		25mm F/1.2 HFOV 25°
Thermal Imager	OPTION TI-5		35mm F/1.2 HFOV 9°		35mm F/1.2 HFOV 17.6°
	OPTION TI-6		50mm F/1.2 HFOV 6°		50mm F/1.2 HFOV 12.4°
	OPTION TI-7		60mm F/1.25 HFOV 5.5°		60mm F/1.25 HFOV 11°
	OPTION VIS-1		Color camera with Zoom SD 530TVL HFOV 57.8° to 1.7° 36X	Color camera with Zoom SD 530TVL HFOV 57.8° to 1.7° 36X	Color camera with Zoom SD 530TVL HFOV 57.8° to 1.7° 36X
Visible Imager	OPTION VIS-2		HD 1080TVL HFOV 63.7° to 2.3° 30X		HD 1080TVL HFOV 63.7° to 2.3° 30X
	OPTION VIS-3				
	Option				
Pan and Tilt	Pan Range	continuous	continuous	continuous	continuous
	Tilt Range	- 3° to +93°	120°	- 3° to +93°	120°
	Pan Speed	from 0.05°/s up to 150°/s	180°/s	from 0.05°/s up to 150°/s	180°/s
	Tilt Speed	from 0.05°/s up to 100°/s	180°/s	from 0.05°/s up to 100°/s	180°/s
Packaging	Environmental rating	IP66 (Ball-down configuration)	IP67 - Marinized (Xylan)	IP66 (Ball-down configuration)	IP67 - Marinized (Xylan)
	Operation temperature	-40°C to +55°C (heater inside)	-40°C to +50°C (heater inside)	-40°C to +55°C (heater inside)	-40°C to +50°C (heater inside)
	Weight	7 kg	7 kg	7 kg	7 kg
	Size LxWxH	245 x 245 x 375 mm	200 x 200 x 368 mm	245 x 245 x 375 mm	200 x 200 x 368 mm
	Connector	Sealing gland cable	Single Neptune Connector (IP67)	Sealing gland cable	Single Neptune Connector (IP67)
	Color	Grey	White or Black	White	White or Black
Control	Interface	Serial interface RS485	Serial interface RS485	Serial interface RS485	Serial interface RS485
	protocol	Pelco-D / Pelco-P	Pelco-D and more	Pelco-D / Pelco-P	Pelco-D and more
Video Outputs	Video 1	Analog PAL 25Hz	Analog PAL 25Hz (Thermal Imager)	Analog PAL 25Hz	Analog PAL 25Hz (Thermal Imager)
	Video 2		Analog PAL 25Hz (Visible Imager)		Analog PAL 25Hz (Visible Imager)
Export Status		No License Required (inside EU)	US DoC (EAR)	No License Required (inside EU)	US DoC (EAR)
Thermal Imager DRI Ranges			Refer to Page 12 for corresponding thermal cores		

1. Surveillance thermal cameras – uncooled PTZ mid and long Range

Manufacturer		SILENT SENTINEL	SILENT SENTINEL	SILENT SENTINEL	GENERAL DYNAMICS
Model		AERON TI 640-UF	AERON TI 640-UZ	JAEGER TI 640-UZ	Marine MSS
UNCOOLED THERMAL PTZ CAMERAS for mid and long range surveillance					
Thermal Imager	Sensor	Uncooled LWIR (8-14μ) 640x480 pixels	Uncooled LWIR (8-14μ) 640x480 pixels	Uncooled LWIR (8-14μ) 640x480 pixels	Uncooled LWIR (8-14μ) 640x480 pixels
	Type	VOx 17μ pitch NETD <50mK @ F/1.0	VOx 17μ pitch NETD <50mK @ F/1.0	VOx 17μ pitch NETD <50mK @ F/1.0	VOx 17μ pitch NETD <50mK @ F/1.0
	Lens Type	Fixed Focus Lens - Athermal	Continuous Zoom	Continuous Zoom	2-FOV (discrete)
	OPTION TI-1	65mm F/1.25 HFOV 9.6°	3X: 35-105mm F/1.6 HFOV 18° to 6°	9X: 25-225mm F/1.6 HFOV 12° to 1.3°	20-80mm F/1.0 HFOV 29° to 7.3°
	OPTION TI-2	100mm F/1.6 HFOV 6.2°	3X: 35-105mm F/1.0 HFOV 18° to 6°		
Visible Imager		Color camera with Zoom	Color camera with Zoom	Color camera with Zoom	Color camera with Zoom
	OPTION VIS-1	SD 530TVL HFOV 57.8° to 1.7° 36X	SD 530TVL HFOV 57.8° to 1.7° 36X	SD 530TVL HFOV 57.8° to 1.7° 36X	SD 460TVL HFOV 42° to 1.6° 26X
	OPTION VIS-2	HD 1080TVL HFOV 63.7° to 2.3° 30X	HD 1080TVL HFOV 63.7° to 2.3° 30X	HD 1080TVL HFOV 63.7° to 2.3° 30X	
	OPTION VIS-3			HD 1080TVL HFOV 16.5° to 0.5° 33X	
Pan and Tilt	Pan Range	continuous	continuous	continuous	continuous
	Tilt Range	120°	120°	120°	-90° to +30°
	Pan Speed	180°/s	180°/s	180°/s	60°/s
	Tilt Speed	180°/s	180°/s	180°/s	60°/s
	Option			optional through-shaft mount (for radar)	2-axis Gyro-stabilized
Packaging	Environmental rating	IP67 - Marinized (Xylan)	IP67 - Marinized (Xylan)	IP67 - Marinized (Xylan)	IP67 - Marinized & Nitrogen Purged
	Operation temperature	-40°C to +50°C (heater inside)	-40°C to +50°C (heater inside)	-40°C to +50°C (heater inside)	-32°C to +60°C (heater inside)
	Weight	7 kg	7 kg	7 kg	14.5 kg
	Size LxWxH	200 x 200 x 368 mm	200 x 200 x 368 mm	200 x 200 x 368 mm	266 x 215 x 423 mm
	Connector	Single Neptune Connector (IP67)	Single Neptune Connector (IP67)	Single Neptune Connector (IP67)	Mil-Connector (IP67)
Control	Color	White or Black	White or Black	White or Black	White
	Interface	Serial interface RS485	Serial interface RS485	Serial interface RS485	Serial interface RS485
	protocol	Pelco-D and more	Pelco-D and more	Pelco-D and more	TASS and GD
Video Outputs	Video 1	Analog PAL 25Hz (Thermal Imager)	Analog PAL 25Hz (Thermal Imager)	Analog PAL 25Hz (Thermal Imager)	Analog PAL 25Hz (Thermal Imager)
	Video 2	Analog PAL (VIS-1) or HD-SDI (VIS-2)	Analog PAL (VIS-1) / HD-SDI (VIS-2)	Analog PAL (VIS-1) / HD-SDI (VIS-2&3)	Analog PAL 25Hz (Visible Imager)
Export Status		US DoC (EAR)	US DoC (EAR)	US DoC (EAR)	US DoS (ITAR)
Thermal Imager DRI Ranges man-size target		D / R / I	D / R / I	D / R / I	D / R / I
	OPTION TI-1	2300 / 550 / 280m	3000 / 800 / 400m	5000 / 1400 / 1000m	2800 / 680 / 330m
	OPTION TI-2	3000 / 800 / 400m	3000 / 800 / 400m		

1. Surveillance thermal cameras – cooled PTZ very long range

Manufacturer		GENERAL DYNAMICS	SILENT SENTINEL	GENERAL DYNAMICS	GENERAL DYNAMICS
Model		VZ250	JAEGER TI 640-CZ	VZ750	VZ1010
COOLED THERMAL PTZ CAMERAS for very long range 24/7 surveillance					
Thermal Imager	Sensor	Cooled MWIR (3-5µ) 640x480 pixels	Cooled MWIR (3-5µ) 640x512 pixels	Cooled MWIR (3-5µ) 640x480 pixels	Cooled MWIR (3-5µ) 640x480 pixels
	Type	MCT 12µ pitch NETD <20mK	InSb 15µ pitch NETD <20mK	MCT 12µ pitch NETD <20mK	MCT 12µ pitch NETD <20mK
	Lens Type	3-FOV (discrete)	18X Continuous Zoom	5X Continuous Zoom	4-FOV (discrete)
	OPTION TI-1	17 to 250mm F/4.0 HFOV 25.5° to 1.8°	30-550mm F/4.0 HFOV 18° to 1.0°	150-750mm F/4.0 HFOV 2.9° to 0.6°	95 to 1000mm F/4.0 HFOV 4.6° to 0.4°
	OPTION TI-2				
Visible Imager		Color camera with Zoom	Color camera with Zoom	Color camera with Zoom	Color camera with Zoom
	OPTION VIS-1	SD 460TVL HFOV 42° to 1.6° 26X	SD 530TVL HFOV 57.8° to 1.7° 36X	SD 560TVL HFOV 31.6° to 0.22° 55X	SD 560TVL HFOV 31.6° to 0.22° 55X
	OPTION VIS-2		HD 1080TVL HFOV 63.7° to 2.3° 30X		
	OPTION VIS-3		HD 1080TVL HFOV 16.5° to 0.5° 33X		
Pan and Tilt	Pan Range	continuous	continuous	continuous	continuous
	Tilt Range	+/- 60°	120°	+/- 60°	+/- 60°
	Pan Speed	300°/s	180°/s	120°/s	120°/s
	Tilt Speed	300°/s	180°/s	120°/s	120°/s
	Option		optional through-shaft mount (for radar)	optional Eyesafe LRF 30km Range	optional Eyesafe LRF 30km Range
Packaging	Environmental rating	IP67 - Marinized (Xylan)	IP67 - Marinized (Xylan)	IP67 - Marinized (Xylan)	IP67 - Marinized (Xylan)
	Operation temperature	-32°C to +60°C (heater inside)	-40°C to +50°C (heater inside)	-32°C to +60°C (heater inside)	-32°C to +60°C (heater inside)
	Weight	<80 kg	<20 kg	<50 kg	<80 kg
	Size LxWxH		200 x 200 x 368 mm		
	Connector	MIL-Connector (IP67)	Single Neptune Connector (IP67)	MIL-Connector (IP67)	MIL-Connector (IP67)
	Color	White or Sand	White or Black	White or Sand	White or Sand
Control	Interface	Serial interface RS485	Serial interface RS485	Serial interface RS485	Serial interface RS485
	protocol	TASS or GD protocol	Pelco-D and more	TASS or GD protocol	TASS or GD protocol
Video Outputs	Video 1	Analog PAL 25Hz (Thermal Imager)	Analog PAL 25Hz (Thermal Imager)	Analog PAL 25Hz (Thermal Imager)	Analog PAL 25Hz (Thermal Imager)
	Video 2	Analog PAL 25Hz (Visible Imager)	Analog PAL (VIS-1) / HD-SDI (VIS-2&3)	Analog PAL 25Hz (Visible Imager)	Analog PAL 25Hz (Visible Imager)
Export Status		US DoS (ITAR)	US DoS (ITAR)	US DoS (ITAR)	US DoS (ITAR)
Thermal Imager DRI Ranges man-sized target		D / R / I	D / R / I	D / R / I	D / R / I
	OPTION TI-1	14 / 5 / 2.5 km	18 / 10 / 4.5 km	25 / 15 / 7.5 km	37 / 20 / 10 km
	OPTION TI-2				

2. Stainless steel cameras – visible and thermal





Manufacturer Model		Acal BFI ICC SSTI 640	SILENT SENTINEL OCULUS SSTI 640	SILENT SENTINEL AERON SSTI 640	SILENT SENTINEL AERON SSTI 640Z
STAINLESS STEEL THERMAL CAMERAS for Perimeter Surveillance in Marine or Corrosive Environment					
Thermal Imager	Sensor	Uncooled LWIR (8-14μ) 640x480 pixels	Uncooled LWIR (8-14μ) 640x480 pixels	Uncooled LWIR (8-14μ) 640x480 pixels	Uncooled LWIR (8-14μ) 640x480 pixels
	Type	VOx 17μ pitch NETD <50mK @ F/1.0	VOx 17μ pitch NETD <50mK @ F/1.0	VOx 17μ pitch NETD <50mK @ F/1.0	VOx 17μ pitch NETD <50mK @ F/1.0
	Lens Type	Fixed Focus Lens - Athermal	Fixed Focus Lens - Athermal	Fixed Focus Lens - Athermal	Continuous Zoom
	OPTION TI-1	7.5mm F/1.2 HFOV 90°	7.5mm F/1.2 HFOV 90°	Fixed Focus 65mm F/1.25 HFOV 9.6°	3X Zoom: 35-105mm F/1.6 HFOV 18°-6°
	OPTION TI-2	14.2mm F/1.2 HFOV 44°	14.2mm F/1.2 HFOV 44°	Fixed Focus 100mm F/1.6 HFOV 6.2°	3X Zoom: 35-105mm F/1.0 HFOV 18°-6°
	OPTION TI-3	16.7mm F/1.2 HFOV 37°	16.7mm F/1.2 HFOV 37°		
	OPTION TI-4	25mm F/1.2 HFOV 25°	25mm F/1.2 HFOV 25°		
	OPTION TI-5	35mm F/1.2 HFOV 17.6°	35mm F/1.2 HFOV 17.6°		
Visible Imager	OPTION TI-6	50mm F/1.2 HFOV 12.4°	50mm F/1.2 HFOV 12.4°		
	OPTION TI-7		60mm F/1.25 HFOV 11°		
	OPTION VIS-1		Color camera with Zoom SD 530TVL HFOV 57.8° to 1.7° 36X	Color camera with Zoom SD 530TVL HFOV 57.8° to 1.7° 36X	Color camera with Zoom SD 530TVL HFOV 57.8° to 1.7° 36X
	OPTION VIS-2		HD 1080TVL HFOV 63.7° to 2.3° 30X	HD 1080TVL HFOV 63.7° to 2.3° 30X	HD 1080TVL HFOV 63.7° to 2.3° 30X
Pan and Tilt	OPTION VIS-3	Visible only version available (no TI)	Visible only version available (no TI)	Visible only version available (no TI)	Visible only version available (no TI)
	Pan Range		continuous	continuous	continuous
	Tilt Range		120°	120°	120°
	Pan Speed		150°/s	150°/s	150°/s
Packaging	Tilt Speed		150°/s	150°/s	150°/s
	Option				
	Environmental rating	IP67 - Stainless Steel AISI316L	IP67 - Stainless Steel AISI317	IP67 - Stainless Steel AISI318	IP67 - Stainless Steel AISI318
	Operation temperature	-20°C to +55°C	-40°C to +50°C (heater inside)	-40°C to +50°C (heater inside)	-40°C to +50°C (heater inside)
	Weight	about 4 kg	about 10 kg	about 12 kg	about 12 kg
	Size LxWxH	375mm L x 150mm D (w/o sunshield)	200 x 200 x 368 mm	200 x 250 x 368 mm	200 x 250 x 368 mm
Control	Connector	2 M20x1,5 nickel brass cable gland	Single Neptune Connector (IP67)	Single Neptune Connector (IP67)	Single Neptune Connector (IP67)
	Color	Electro-Polished	Polished	Polished	Polished
	Interface	IP or Serial interface RS485	Serial interface RS485	Serial interface RS485	Serial interface RS485
Video Outputs	protocol	ONVIF (IP) & Pelco-D (Analog)	Pelco-D and more	Pelco-D and more	Pelco-D and more
	Video 1	IP 30Hz	Analog PAL 25Hz (Thermal Imager)	Analog PAL 25Hz (Thermal Imager)	Analog PAL 25Hz (Thermal Imager)
Export Status	Video 2	Analog PAL 25Hz or 9Hz	Analog PAL 25Hz (Visible Imager)	Analog PAL (VIS-1) or HD-SDI (VIS-2)	Analog PAL (VIS-1) or HD-SDI (VIS-2)
	Thermal Imager DRI Ranges	US DoC (EAR)	US DoC (EAR)	US DoC (EAR)	US DoC (EAR)

Refer to Page 12 for corresponding thermal cores

2. Stainless steel cameras – thermal radiometric

Manufacturer Model	Acal BFI ICC SSTI 384R	Acal BFI ICC SSTI 640R	SILENT SENTINEL AERON TI 384R	SILENT SENTINEL AERON TI 640R	
STAINLESS STEEL THERMAL CAMERAS for Hot Spot Monitoring or Fire Detection in Industrial Environment					
	Sensor	Uncooled LWIR (8-14μ) 640x480 pixels	Uncooled LWIR (8-14μ) 640x480 pixels	Uncooled LWIR (8-14μ) 640x480 pixels	Uncooled LWIR (8-14μ) 640x480 pixels
	Type	ASi 25μ pitch NETD <80mK @ F/1.0	ASi 17μ pitch NETD <80mK @ F/1.0	ASi 25μ pitch NETD <80mK @ F/1.0	ASi 17μ pitch NETD <80mK @ F/1.0
	Measurement Range	-20 to +120°C (up to +650 °C)	-20 to +120°C (up to +650 °C)	-20 to +120°C (up to +650 °C)	-20 to +120°C (up to +650 °C)
	Accuracy (the greater of)	+/-2°C or +/-2%	+/-2°C or +/-2%	+/-2°C or +/-2%	+/-2°C or +/-2%
	Lens Type	Fixed Focus Lens - Athermal	Fixed Focus Lens - Athermal	Athermal - Fixed or Motorized Focus	Athermal - Fixed or Motorized Focus
	OPTION TI-1	8mm F/0.8 FOV 62°x48°	8mm F/0.8 FOV 68°x54°	8mm F/0.8 FOV 62°x48°	8mm F/0.8 FOV 68°x54°
	OPTION TI-2	12mm F/1.0 FOV 44°x33°	12mm F/1.0 FOV 49°x27°	12mm F/1.0 FOV 44°x33°	12mm F/1.0 FOV 49°x27°
Radiometric Thermal Imager	OPTION TI-3	20mm F/1.0 FOV 27°x20°	20mm F/1.0 FOV 30°x23°	20mm F/1.0 FOV 27°x20°	20mm F/1.0 FOV 30°x23°
	OPTION TI-4	27mm F/1.0 FOV 20°x15°	27mm F/1.0 FOV 23°x17°	27mm F/1.0 FOV 20°x15°	27mm F/1.0 FOV 23°x17°
	OPTION TI-5	35mm F/1.0 FOV 15°x12°	35mm F/1.0 FOV 17°x13°	35mm F/1.0 FOV 15°x12°	35mm F/1.0 FOV 17°x13°
	OPTION TI-6	50mm F/1.0 FOV 11°x8°	50mm F/1.0 FOV 12°x9°	50mm F/1.0 FOV 11°x8°	50mm F/1.0 FOV 12°x9°
	OPTION VIS-1			SD 530TVL HFOV 57.8° to 1.7° 36X	SD 530TVL HFOV 57.8° to 1.7° 36X
	OPTION VIS-2			HD 1080TVL HFOV 63.7° to 2.3° 30X	HD 1080TVL HFOV 63.7° to 2.3° 30X
	Pan Range			continuous	continuous
	Tilt Range			120°	120°
Visible Imager	Pan Speed		180°/s	180°/s	
	Tilt Speed		180°/s	180°/s	
	Option				
	Option				
Pan and Tilt	Environmental rating	IP67 - Stainless Steel AISI316L	IP67 - Stainless Steel AISI316L	IP67 - Marinized (Xylan)	IP67 - Marinized (Xylan)
	Operation temperature	-20°C to +55°C	-20°C to +55°C	-40°C to +50°C (heater inside)	-40°C to +50°C (heater inside)
	Weight	about 4 kg	about 4 kg	7 kg	7 kg
	Size LxWxH	375mm L x 150mm D (w/o sunshield)	375mm L x 150mm D (w/o sunshield)	200 x 200 x 368 mm	200 x 200 x 368 mm
	Connector	2 M20x1,5 nickel brass cable gland	2 M20x1,5 nickel brass cable gland	Single Neptune Connector (IP67)	Single Neptune Connector (IP67)
Packaging	Color	Electro-Polished	Electro-Polished	White or Black	White or Black
	Interface	IP (thermog.)	IP (thermog.)	RS485 (PT) & IP (thermog.)	RS485 (PT) & IP (thermog.)
	Protocol	COX	COX	Pelco-D and COX	Pelco-D and COX
	Power	24 VDC	24 VDC	12-24 VDC	12-24 VDC
	Video 1	Analog PAL 25Hz (Thermal Imager)	Analog PAL 25Hz (Thermal Imager)	Analog PAL 25Hz (Thermal Imager)	Analog PAL 25Hz (Thermal Imager)
Control	Video 2	IP (Thermography)	IP (Thermography)	IP (Thermography)	IP (Thermography)
	Video 3			Analog PAL (VIS-1) or HD-SDI (VIS-2)	Analog PAL (VIS-1) or HD-SDI (VIS-2)
	Temperature Alarms	2 ROI replay Alarms	2 ROI replay Alarms	2 ROI replay Alarms	2 ROI replay Alarms
Outputs	Export Status	NLR	NLR	NLR	NLR





3. Explosion-proof (ATEX) visible and thermal cameras

Manufacturer Model	TECNOVIDEO EX129V	TECNOVIDEO EX129IR	TECNOVIDEO EX129IRR	TECNOVIDEO EXPTZD (Dual)	
ATEX SECURITY & SAFETY SYSTEMS for Protection of Critical Facilities (Oil & Gas, Chemical, Powders,..) requiring Explosion Proof Equipment					
	Sensor Type	Uncooled LWIR (8-14μ) 640x480 pixels	Uncooled LWIR (8-14μ) 640x480 pixels	Uncooled LWIR (8-14μ) 640x480 pixels	
	Thermal Measurement Range	VOx 17μ pitch NETD <50mK @ F/1.0	ASi 17μ pitch NETD <80mK @ F/1.0	VOx 17μ pitch NETD <50mK @ F/1.0	
	Accuracy (the greater of)			-20 to +120°C (up to +650 °C) +/-2°C or +/-2%	
	Lens Type		Fixed Focus Lens - Athermal	Fixed Focus Lens - Athermal	Fixed Focus Lens - Athermal
	OPTION TI-1		7.5mm F/1.2 HFOV 90°	8mm F/0.8 FOV 68°x54°	7.5mm F/1.2 HFOV 90°
	OPTION TI-2		14.2mm F/1.2 HFOV 44°	12mm F/1.0 FOV 49°x27°	14.2mm F/1.2 HFOV 44°
	OPTION TI-3		16.7mm F/1.2 HFOV 37°	20mm F/1.0 FOV 30°x23°	16.7mm F/1.2 HFOV 37°
	OPTION TI-4		25mm F/1.2 HFOV 25°	27mm F/1.0 FOV 23°x17°	25mm F/1.2 HFOV 25°
OPTION TI-5		35mm F/1.2 HFOV 17.6°	35mm F/1.0 FOV 17°x13°	35mm F/1.2 HFOV 17.6°	
OPTION TI-6		50mm F/1.2 HFOV 12.4°		50mm F/1.2 HFOV 12.4°	
OPTION TI-7					
OPTION TI-8		also available in 320x240 resolution	also available in 384x288 resolution	also available in 320x240 resolution	
Visible Imager	Sony Color camera with Zoom			Sony Color camera with Zoom	
Pan and Tilt	Pan Range			continuous	
	Tilt Range			+/- 90°	
	Pan Speed			0 - 18°/s	
	Tilt Speed			0 - 10°/s	
Packaging	Environmental rating	IP67 - Stainless Steel AISI316L	ATEX - IP67 - Stainless Steel AISI316L	ATEX - IP67 - Stainless Steel AISI316L	
	Operation temperature	-20°C to +55°C	-20°C to +55°C	-20°C to +55°C	-20°C to +55°C
	Weight	about 4 kg	about 4 kg	about 4 kg	25 kg
	Size LxWxH	375mm L x 150mm D (w/o sunshield)	375mm L x 150mm D (w/o sunshield)	375mm L x 150mm D (w/o sunshield)	380 x 653 x 584 mm
	Connector	2 M20x1,5 nickel brass cable gland	2 M20x1,5 nickel brass cable gland	2 M20x1,5 nickel brass cable gland	1 M25x1,5 cable entry
Control	Color	Electro-Polished	Electro-Polished	Electro-Polished	Electro-Polished
	Interface	Serial Interface	IP or RS232	Serial Interface & IP (thermog.)	Serial interface
	protocol	Sony VISCA, Pelco D	ONVIF, Pelco D	COX	Pelco-D
	power	12 VDC	12-24 VDC, 24 VAC, PoE 802.3af		
Outputs	Video 1	Analog PAL (VIS-1)	Analog PAL 25Hz or 9Hz	Analog PAL 25Hz (Thermal Imager)	Analog PAL 25Hz (Thermal Imager)
	Video 2		IP (ONVIF)	IP (Thermography)	Analog PAL (VIS-1) or HD-SDI (VIS-2)
	Video 3				
Export Status	Temperature Alarms	NLR	US DoC (EAR)	2 ROI replay Alarms NLR US DoC (EAR)	

4. Thermal camera modules – uncooled

Manufacturer		DRS	Acal BFI	DRS	Acal BFI
Model		Tamarisk 320	ICC-TI 320	Tamarisk 640	ICC-TI 640
UNCOOLED THERMAL CAMERA CORES for Military and Security					
Thermal Imager	Type	Uncooled LWIR (8-14μ)	Uncooled LWIR (8-14μ)	Uncooled LWIR (8-14μ)	Uncooled LWIR (8-14μ)
	Detector	Microbolometer VOx 17μ pitch	Microbolometer VOx 17μ pitch	Microbolometer VOx 17μ pitch	Microbolometer VOx 17μ pitch
	Resolution	320x240 pixels	320x240 pixels	640x480 pixels	640x480 pixels
	NETD	<50mK @ F/1.0	<50mK @ F/1.0	<50mK @ F/1.0	<50mK @ F/1.0
	Lens Type	Athermal	Athermal Single Focal or Contin. Zoom	Athermal	Athermal Single Focal or Cont. Zoom
	Focus	Manual focus	Manual (Athermal) or Motorized (Zoom)	Manual focus	Manual (Athermal) or Motorized (Zoom)
	OPTION TI-0	No-Lens, M34x0.5 mount		No-Lens, M34x0.5 mount	
	OPTION TI-1	3.8mm F/1.4 HFOV 90°	5mm F/1.3 HFOV 70°	7.5mm F/1.4 HFOV 90°	60mm F/1.25 HFOV 11°
	OPTION TI-2	7.5mm F/1.2 HFOV 40°	60mm F/1.25 HFOV 5.5°	14.2mm F/1.2 HFOV 44°	100mm F/1.6 HFOV 6.2°
	OPTION TI-3	13mm F/1.0 HFOV 24°	65mm F/1.25 HFOV 4.8°	16.7mm F/1.2 HFOV 37.5°	15-90mm F/1.4 HFOV 40°-7°
OPTION TI-4	19mm F/1.2 HFOV 16°	100mm F/1.6 HFOV 3.1°	25mm F/1.2 HFOV 24.8°	35-105mm F/1.4 HFOV 18°-6°	
OPTION TI-5	35mm F/1.2 HFOV 9°	15-90mm F/1.4 HFOV 20°-3.5°	35mm F/1.2 HFOV 17.6°	25-225mm F/1.4 HFOV 24.5°-2.7°	
OPTION TI-6	50mm F/1.2 HFOV 6°	35-105mm F/1.4 HFOV 9°-3°	50mm F/1.2 HFOV 12.4°		
Packaging	Environmental rating	Aluminium Case, sealed lens IP67	Aluminium Case, sealed lens IP67	Aluminium Case, sealed lens IP67	Aluminium Case, sealed lens IP67
	Operation temperature	-40°C to +67°C	-40°C to +67°C	-40°C to +67°C	-40°C to +67°C
	Weight	29 g (no lens)	29 g (no lens)	65 g (no lens)	65 g (no lens)
	Size LxWxH	34 x 30 x 30 mm	34 x 30 x 30 mm	46 x 40 x 31 mm	46 x 40 x 31 mm
	Connector	Multi-pin mini connector	Multi-pin mini connector	Multi-pin mini connector	Multi-pin mini connector
Control	Color	Black	Black	Black	Black
	Interface	USB2, RS232	USB2, RS232	IP or RS232	IP or RS232
	Protocol	DRS proprietary	DRS proprietary	DRS proprietary	DRS proprietary
	Power	5-18 VDC, < 1.1 W	5-18 VDC, < 1.1 W	5-18 VDC, < 1.4 W	5-18 VDC, < 1.4 W
Video Outputs	Video 1	Analog PAL 25Hz or 9Hz	Analog PAL 25Hz or 9Hz	Analog PAL 25Hz or 9Hz	Analog PAL 25Hz or 9Hz
	Video 2	14/8 bit digital video (Camera Link)	14/8 bit digital video (Camera Link)	14/8 bit digital video (Camera Link)	14/8 bit digital video (Camera Link)
Export Status	US DoC (EAR)	US DoC (EAR)	US DoC (EAR)	US DoC (EAR)	
Thermal Imager	D / R / I				
	OPTION TI-1	130 / 40 / 25m	160 / 45 / 30m	250 / 70 / 40m	2100 / 510 / 250m
	OPTION TI-2	250 / 70 / 40m	2100 / 510 / 250m	490 / 120 / 80m	3000 / 780 / 400m
	OPTION TI-3	480 / 115 / 80m	2300 / 550 / 280m	580 / 150 / 100m	2800 / 730 / 3500m
	OPTION TI-4	700 / 170 / 120m	3000 / 780 / 400m	950 / 250 / 120m	3000 / 800 / 400m
	OPTION TI-5	1300 / 350 / 170m	2800 / 730 / 3500m	1300 / 350 / 170m	5000 / 1400 / 1000m
	OPTION TI-6	1800 / 450 / 220m	3000 / 800 / 400m	1800 / 450 / 220m	

4. Thermal camera modules – cooled

Manufacturer		IRCAMERAS		IRCAMERAS		IRCAMERAS		IRCAMERAS			
Model		Niatros™ 320 for Gas Detection		Niatros™ SD for Gas Detection		IRC906 Core for Long Range Surveillance		IRC912 Core for Long Range Surveillance			
COOLED THERMAL OEM MODULES for Gas Detection and Analysis (Niatros) for Long Range Surveillance (IRC9xx)											
		Detector type		Indium Antimonide (InSb)							
Detector		Spectral response		< 1.0µm to 5.3µm							
		Resolution		320 x 256 pixels		640 x 512 pixels		640 x 512 pixels		1280 x 1024 pixels	
		Pixel pitch		30µm		20µm		20µm		12µm	
		NEdT		< 15 mK typ.		< 15 mK typ.		< 15 mK typ.		< 25 mK typ.	
		Operability		> 99.5%		> 99.5%		> 99.5%		> 99.5%	
Dewar / Cooler		Cooler Type		Rotary or linear Stirling cryocooler							
		Cooler MTBF		10,000 hrs, 45,000 hrs or 90,000 hrs depending detector and cooler model							
		Cool down time		< 6 min @ 23°C ambient typical - < 8 min @ 60°C ambient typical							
		Cold Shield f/#		f/1.5 & f/2.3 standard, other on request				f/4.0 & f/5.5 standard; custom cold shields on request			
		Cold Filter		Narrow Bandpath for Gas Analysis (LSI patent)				3.0 - 5.0µ or 3.6 - 4.9µ or 1.5 - 5µ, custom filter on request			
Electronics		Optional filter wheel						Motorized 4-positions warm filter wheel; 25.4 x 1.0mm filters			
		Analog display video		NTSC, PAL (with S Video option)		NTSC, PAL (with S Video option)		NTSC, PAL (with S Video option)		HD-SDI available	
		Digital data		14-bits Camera Link (standard), CoaXPress (option), Gig-E (option)							
		Video compression		H264 baseline profile via Ethernet (optional)							
		Synchronization modes		Internal / external sync and clock							
Optics		max full frame rate		as supported by sensor at up to 80 M pixels/sec on digital stream interface							
		Processing (option)		Compressor w/FPGA for video tracking or DSP for analytics							
		Lens direct technology		Native support for motorized focus and continuous zoom lenses							
		Processing		Local Aera processing, dyn. edge & contrast enhancement, AGC/ALC, e-Zoom, color, symbology, reticle							
		Available f/1.5		consult factory							
General		Available f/2.3		f/2.3 fixed focal length 12, 25, 50, 100mm							
		Available f/4.0		15-330 mm continuous zoom (optional 2.0x, 2.5x extender)							
		Available f/5.5		15-435 mm continuous zoom (optional 2.0x, 2.5x extender)							
		Power		< 8 W @ 23°C ambient steady state (w/o lens), < 12 W during cooling down (w/o lens)							
Export Status		System weight		< 3.5 kg typical without lens							
		Size (LxHxW)		140 x 73 x 64 mm typical without lens							
		Operating temperature range		-40°C to +65°C							
		Storage temperature range		-50°C to +70°C							
Export Status		US DoS (ITAR)		US DoS (ITAR)		US DoS (ITAR)		US DoS (ITAR)			

4. Thermal camera modules – radiometric

Manufacturer Model	SOMO SM080T	DRS Tamarisk 320 R	COX CX320	COX CX610 / CX640	
THERMAL RADIOMETRIC CAMERAS for Thermography, Security & Safety					
					
Thermal Imager	Type	Uncooled LWIR (8-14μ)	Uncooled LWIR (8-14μ)	Uncooled LWIR (8-14μ)	
	Detector	80 x 80 pixels 34μ pitch	320x240 pixels 17μ pitch	384x288 pixels 25μ pitch	640x480 pixels 17μ pitch
	Resolution	80 x 80 pixels	320x240 pixels	384x288 pixels	640x480 pixels
	NETD	<100mK @ F/1.0	<50mK @ F/1.0	<80mK @ F/1.0	<80mK @ F/1.0
	Lens Type	Athermal	Athermal	Athermal	Athermal
	Focus	Fixed focus	Manual focus	Manual or Motorized focus	Manual or Motorized focus
	OPTION TI-1	2.7mm FOV 60°x60°	7.7mm FOV 40°x30°	8mm F/0.8 FOV 62°x48°	8mm F/0.8 FOV 68°x54°
	OPTION TI-2	3.2mm FOV 50°x50°		12mm F/1.0 FOV 44°x33°	12mm F/1.0 FOV 49°x27°
	OPTION TI-3	4.6mm FOV 35°x35°		20mm F/1.0 FOV 27°x20°	20mm F/1.0 FOV 30°x23°
	OPTION TI-4	6.7mm FOV 24°x24°		27mm F/1.0 FOV 20°x15°	27mm F/1.0 FOV 23°x17°
OPTION TI-5	11.5mm FOV 14°x14°		35mm F/1.0 FOV 15°x12°	35mm F/1.0 FOV 17°x13°	
OPTION TI-6			50mm F/1.0 FOV 11°x8°	50mm F/1.0 FOV 12°x9°	
OPTION TI-7			75mm F/1.0 FOV 7°x5°	75mm F/1.0 FOV 8°x6°	
OPTION TI-8			100mm F/1.0 FOV 5°x4°	100mm F/1.0 FOV 6°x5°	
Radiometric Specifications	Measurement Range (Low Temp)	-20°C to +120°C	-40°C to +80°C	-20 to +120°C	-20 to 120°C
	Accuracy (Low Temp)	+/-5°C or +/-5%	+/-5°C or +/-10%	+/-2°C or 2%	+/-2°C or 2%
	Measurement Range (High Temp)	0°C to +600°C	0°C to +550°C	-20 to +650°C	-20 to 650°C
	Accuracy (High Temp)	+/-20°C or +/-20%	+/-20°C or +/-20%	+/-2°C or 2%	+/-2°C or 2%
	Function	8 ROI + Spotmeter	Isotherm + 8x8 pixel Spotmeter	Spot, ROI, Isotherm	Spot, ROI, Isotherm
	Thermogram 1	Analog video (false colors)	Analog video (false colors)	Analog video (false colors)	Analog video (false colors)
	Thermogram 2		Radiometric 14-bit RGB	All pixels Temp. via IP	All pixels Temp. via IP
	Alarm 1			2 ROI relay alarms	2 ROI relay alarms
	Alarm 2			10 spots 30 ROI alarm trigger via SW	10 spots 30 ROI alarm trigger via SW
	Other		Image Contrast Enhancement	Hot/Cold Spot Tracker	Hot/Cold Spot Tracker
Packaging	Environmental rating	IP67 - Marinized (Xylan)	Aluminium case + sealed lens IP67	Aluminium case	Aluminium case
	Operation temperature	-20°C to +60°C	-20°C to +80°C	-15°C to +50°C	-15°C to +50°C
	Weight	350 g	48 g	500 g (w/o lens)	650 g (w/o lens)
	Size LxWxH	115 x 49 x 49 mm	37 x 35 x33 mm	131 x 77.6 x 67.6 mm	183 x 77.6 x 67.6 mm
	Connector	2 sealing glands	Multipin mini	BNC, RJ45, I/O (6 pins)	BNC, RJ45, I/O (6 pins)
Control	Interface	RS485/422/232 or I2C	RS232, Camera Link, USB	Ethernet 10/100 base, TCP, DHCP	Ethernet 10/100 base, TCP, DHCP
	Power	5 VDC or 12 VDC or 240 VAC	5-18 VDC, 1.1 W	12 VDC, 5W	12 VDC, 5W
Video Outputs	Video 1	Analog PAL 25Hz	Analog PAL 25Hz or 9Hz	Analog PAL 25Hz	Analog PAL 25Hz (Models 610 & 640)
	Video 2		14-bit CameraLink	IP	IP (Model 640 only)
Export Status	NLR	US DoC (EAR)	NLR	NLR	

5. Handheld thermal cameras

Manufacturer		L3	L3	L3	L3
Model		X640	X640-AFOC	X320	X320-AFOC
THERMAL CAMERA HANDHELD for Military & Police Search & Rescue					
Thermal Imager	Type	Uncooled LWIR (8-14μ)	Uncooled LWIR (8-14μ)	Uncooled LWIR (8-14μ)	Uncooled LWIR (8-14μ)
	Detector	Microbolometer ASi 17μ pitch	Microbolometer ASi 17μ pitch	Microbolometer ASi 17μ pitch	Microbolometer ASi 17μ pitch
	Resolution	640x480 pixels	640x480 pixels	320x240 pixels	320x240 pixels
	NETD	<40mK @ F/1.0	<40mK @ F/1.0	<40mK @ F/1.0	<40mK @ F/1.0
	Lens Type	Athermal Single Focal	Athermal Single Focal	Athermal Single Focal	Athermal Single Focal
	Focus	Manual focus	Manual focus	Manual focus	Manual focus
	OPTION TI-1	25mm F/1.0 24°	25mm F/1.0 w/ 2X Afocal HFOV 12°	25mm F/1.0 12°	25mm F/1.0 w/ 2X Afocal HFOV 6°
OPTION TI-2	35mm F/1.0 18°			25mm F/1.0 w/ 3X Afocal HFOV 4°	
Packaging	Environmental rating	IP67, shock proof 1 meter drop	IP67, shock proof 1 meter drop	IP67, shock proof 1 meter drop	IP67, shock proof 1 meter drop
	Operation temperature	-20°C to +60°C	-20°C to +60°C	-20°C to +60°C	-20°C to +60°C
	Weight	381 g	381 g (w/o clip-on 2X or 3X Afocal)	381 g	381 g (w/o clip-on 2X or 3X Afocal)
	Size LxWxH	34 x 30 x 30 mm	34 x 30 x 30 mm	34 x 30 x 30 mm	34 x 30 x 30 mm
	Connector	Mini Jack for real time Video	Mini Jack for real time Video	Mini Jack for real time Video	Mini Jack for real time Video
Control	Color	Black	Black	Black	Black
	Polarity	Black Hot, White Hot	Black Hot, White Hot	Black Hot, White Hot	Black Hot, White Hot
	Zoom	2X, 3X & 4X e-Zoom	2X, 3X & 4X e-Zoom	2X, 3X & 4X e-Zoom	2X, 3X & 4X e-Zoom
	Power	5-18 VDC, < 1.1 W	5-18 VDC, < 1.1 W	5-18 VDC, < 1.1 W	5-18 VDC, < 1.1 W
Power	Power 1	2 AA batteries (6-hours w/ Li ones)	2 AA batteries (6-hours w/ Li ones)	2 AA batteries (6-hours w/ Li ones)	2 AA batteries (6-hours w/ Li ones)
	Power 2	12 VDC on rear outlet jack	12 VDC on rear outlet jack	12 VDC on rear outlet jack	12 VDC on rear outlet jack
Video Outputs	Video 1	Dimmable Monochrome LCD Viewer	Dimmable Monochrome LCD Viewer	Dimmable Monochrome LCD Viewer	Dimmable Monochrome LCD Viewer
	Video 2	Analog NTSC 30Hz	Analog NTSC 30Hz	Analog NTSC 30Hz or 9Hz	Analog NTSC 30Hz or 9Hz
Export Status		US ITAR	US ITAR	US DoC (EAR)	US DoC (EAR)
Thermal Imager DRI Ranges man-size target		D / R / I	D / R / I	D / R / I	D / R / I
	OPTION TI-1	735 / 200 / 120m	1200 / 350 / 200m	735 / 200 / 120m	1200 / 350 / 200m
	OPTION TI-2	1000 / 270 / 160m			1800 / 500 / 300m


6. SWIR cameras

Manufacturer		NIT		IRCAMERAS	
Model		WiDy SWIR 320 A / D	WiDy SWIR 640 A / D	IRC906HS-SWIR	IRC912-SWIR
SWIR CAMERA for Security, Military & Industrial					
Detector	Detector type	Uncooled InGaAs	Uncooled InGaAs	Cooled InSb	Cooled InSb
	Resolution (pixels)	320x256 pixels	640x512 pixels	640 x512	1280 x 1024
	Pixel pitch	25µ	15µ	20 micron	12 micron
	Spectral Band	900 to 1700 µm	900 to 1700 µm	400 to 2500 µm SWIR or custom	400 to 2500 µm SWIR or custom
Cooler	Type			Stirling Linear Cooler	Stirling Linear Cooler
	MTBF			45,000 hrs (typ.)	45,000 hrs (typ.)
Optics	Camera f/#	Depend on the lens	Depend on the lens	f/2.3, f/3.0 & f/4.0 standard, custom cold shields on request	f/2.3, f/3.0 & f/4.0 standard, custom cold shields on request
	Lens mount	C / CS	C / CS	Bayonet	Bayonet
	Optional filter wheel	N/A	N/A	Motorized 4 position warm filter wheel; 25.4mm diameter x 1.0mm thick filters	Motorized 4 position warm filter wheel; 25.4mm diameter x 1.0mm thick filters
	Full Frame Rate	25Hz (A Model) / 150 Hz (D Model)	25Hz (A Model) / 150 Hz (D Model)	475 Hz	119 Hz
Imaging Electronics	Dynamic range	140dB logarithmic (A) / 14-bit (D Mod.)	140dB logarithmic (A) / 14-bit (D Mod.)	14-bits with 13-bit option to increase frame rate at small window sizes	14-bits with 13-bit option to increase frame rate at small window sizes
	Windowing	Yes	Yes	User defined in 4x1 increments; min width=320, min height=32	User defined in 4x1 increments; min width=320, min height=32
	Trigger	Sync I/O, integration out	Sync I/O, integration out	Sync I/O, integration out	Sync I/O, integration out
	Communications	RS232 (A Model) / USB2 (D Model)	RS232 (A Model) / USB2 (D Model)	Serial over CameraLink & Gig-E	Serial over CameraLink & Gig-E
General	Software control	NIT proprietary	NIT proprietary	Cross platform GenICam compliant	Cross platform GenICam compliant
	Power @ 24 VDC	< 2.3 W (though USB for D Model)	< 2.3 W (though USB for D Model)	Steady state power consumption	Steady state power consumption
	System weight	< 200g (w/o lens)	< 200g (w/o lens)		
	Size	46 x 46 x 50 mm	46 x 46 x 68 mm	227 x 130 x 170 mm	228 x 130 x 170 mm
Video Outputs	Operating temp.	-40° to +70°C (A) / 0° to 50°C (D)	-40° to +70°C (A) / 0° to 50°C (D)	-40°C to +55°C (-40°F to +131°F)	-40°C to +55°C (-40°F to +131°F)
	Video 1	Analog PAL (A) / Mini USB2 (D Model)	Analog PAL (A) / Mini USB2 (D Model)	CameraLink	CameraLink
Export Status	Video 2			Gig-E	Gig-E
		NLR	NLR	US DoS (ITAR)	US DoS (ITAR)

7. Low light visible cameras

Manufacturer	Hitachi	Hitachi	Photonis	NIT	
Model	KP-5010P	KP-HD1005-S4	NOCTURN XL	WiDy Intens 1280V	
					
LOW LIGHT VISIBLE CAMERAS for Security, Military & Industry OEM Applications					
Camera	Type	Low Light Full HD	Low Light Full HD	Low Light Megapixel	Intensified Megapixel
	Detector	Color CCD	Color CMOS	Monochrome CMOS	Monochrome CMOS
	Resolution	752 x 582 pixels	1944 x 1092 pixels (2.1Mi)	1280x1024 pixels	1280x1024 pixels
	Reading Mode	Interlaced	progressive scan	rolling shutter	rolling shutter
	Format	1/2"	1/3"	1"	1"
	Sensitivity	Color: 0.03lx (full frame) / 0.002lx (60x int.) B/W: 0.004lx (full frame) / 0.00003lx (60x int.)	Color: 0.2lx (full frame) / 0.007lx (60x int.) B/W: 0.02lx (full frame) / 0.0007lx (60x int.)	about 1 mLux (w/o integration)	< 1 mLux (w/o integration)
	Dynamic Range	50 dB (linear response)	50 dB (linear response)	> 60 dB (linear response)	> 140 dB (Logarithmic response)
	Day & Night Mode	Automatic	Automatic		
	Fog Reduction Algorithm	ON / OFF	ON / OFF		
	Frame rate	max 25 fps (w/o integration)	max 25 fps (w/o integration)	up to 100 fps (full resolution)	
Lens Mount	C - CS	C - CS	C - CS	C - CS	
Intensifier	Type				XR5 (Gen 2+)
	Resolution				64 lp/mm
	Phosphor Screen				18mm Diameter
Packaging	Environmental rating	Aluminium Case	Aluminium Case	Aluminium Case	Aluminium Case
	Operation temperature	-10° to +50°C	-10° to +50°C	-45° to +70°C	-45° to +70°C
	Weight	270g (w/o lens)	400g (w/o lens)	200g (w/o lens)	200g (w/o lens)
	Size LxWxH	64 x 64 x 63mm	103 x 64 x 63mm	81 x 46 x 46 mm	81 x 46 x 46 mm
	Connector	BNC / SBI	BNC / SBI	BNC / CameraLink / Mini USB2	Mini USB3
Control	Interface	RS232 / RS485	RS232 / RS485	Serial via CameraLink or USB	USB3.0
	Trigger			BNC-SMC cable	BNC-SMC cable
	Camera Control	Hitachi proprietary	Hitachi proprietary	Photonis proprietary	NIT proprietary
	Lens Control	DC iris / Video Iris	DC iris / Video Iris		
Video Outputs	Power	12 VDC 190mA	12 VDC 7.8W	5 W (through USB3.0)	5 W (through USB3.0)
	Video 1	Analog PAL	HD-SDI (Full HD)	Analog PAL	Analog PAL (A Model)
	Video 2		VBS: NTSC/PAL (STD Def.)	10-bits CameraLink	14-bits Digital USB2 (D Model)
Export Status	NLR	NLR	NLR	NLR	NLR

8. Video stabilisation

Manufacturer		SRI Sarnoff	SRI Sarnoff	SRI Sarnoff	SRI Sarnoff	
Model		Acadia ILS-6000	Acadia ILS-6100	Acadia ILS-5000 for Sony Block Cameras	Acadia DL Micro - for UAV's	
REAL-TIME VIDEO STABILIZATION for Security, Military & Industry OEM Applications						
		Video Channel(s)	1 CH	1 CH	1 CH	1 CH
		Video 1	PAL or NTSC (autodetect)	PAL or NTSC (autodetect)	PAL or NTSC (autodetect)	Analog video PAL or NTSC (autodetect)
		Video 2				(option) Digital CCIR.BT.656
		Image stabilization	Stab. For camera translation	Stab. For camera translation	Stab. For camera translation	Stab. For camera translation
		Image stabilization	Stab. For camera rotation	Stab. For camera rotation	Stab. For camera rotation	Stab. For camera rotation
		Image stabilization	Stab. For camera scale	Stab. For camera scale	Stab. For camera scale	Stab. For camera scale
		Bypass	passes incoming video if unpowered	passes incoming video if unpowered	passes incoming video if unpowered	
		latency	approx. 60 msec	approx. 60 msec	approx. 60 msec	80 msec
		Image Compression				H264
Image Enhancement				Edge & Contrast		
Metadata				KLV format, MISB RP0604		
Transmitter				IPnDDL2350 / IPnDDL2450 / nVIP2400		
				Spread Spectrum / S. S. / Broadband		
				230-2.36 / 2.40-2.47 / 2.40-2.48 GHz		
				COFDM / COFDM / OFDM		
				Up to 12Mbps / 12Mbps / 54 Mbps		
				4 to 8MHz / 4 to 8MHz / 20MHz		
				No / No / Yes		
				Yes / Yes / Yes		
				Yes / Yes / Yes		
				10 dBm -30 dBm		
		AES 128/256 / AES / WEP-WPA-WPA2				
Packaging		Finish	ruggedized enclosure	OEM PCB	OEM PCB	
		Operation temperature		-30°C to +70°C	-30°C to +70°C	-30°C to +70°C
		Weight	565 g	85 g	14.4 g	52g (Analog video) / 46g (Digital Interface)
		Size LxWxH	165 x 69 x 51 mm	145 x 41 x 23 mm	50 x 50 x 23 mm	63 x 63 x 16 mm
		Connector	BNC (In) BNC (Out)		Plug-onto Sony Blocks FCB-EX	
		Color	Black anodized aluminium			
		Accessories	mouting kits, power Supplies & cables	mouting kits, power Supplies & cables	mouting kits & cables	mouting kits & cables
Control		Interface		RS232, RS422, TTL	UART & 12C	
		Protocol		RS232	Supports the Sony VISCA protocol	web-based configurator manager
		Power	8 - 60 VDC, 2.5 W	8 - 60 VDC, 2.5 W	12 VDC, 1.8 W	12 VDC, 5.8 W
Export Status		NLR / EAR99	NLR / EAR99	NLR / EAR99	NLR / EAR99	

9. Ancillaries

Other complementary products are available from Acal BFi Imaging Division:

- **Camera mounts**
- **Lenses**
- **Cables**
- **Video analytics**
- **Video encoders**
- **Laser range finders**
- **IR blackbodies, IR collimators, IR test benches**
- **IR scene generators**

Other complementary products are also available from other Acal BFi Divisions:

- **Power supplies, DC/DC, fuel cells, PoE injectors, etc.** - Acal BFi Power
- **Custom cables, MIL specs, etc.** - Acal BFi Cables and connectors
- **Wireless antenna, GPS, etc.** - Acal BFi RF and frequency Control
- **Fibre optics, video encoders, etc.** - Acal BFi Fibre Optics
- **Gyros, temperature or humidity sensors, etc.** - Acal BFi Sensors
- **Processors, custom computers, etc.** - Acal BFi Embedded Computing
- **Lasers, laser diodes, windows, etc.** - Acal BFi Photonics
- **Radiometers, colorimeters, etc.** - Acal BFi Test and measurement

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