



MICRO - ICCD



**ULTRA Miniature Intensified CCD
Camera**

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MICRO-ICCD NIGHT VISION / SURVEILLANCE CAMERAS

THE TINY NIGHT VISION CAMERA that's big on numbers (and letters!) and ideal for keeping track of unwanted "guests".



MICRO-ICCD & Nokia 5110



▲ 120m / Lens= 2,500mm
Cloudy night + reflected
lights from buildings @120m



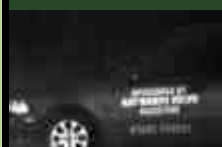
▲ 120m / Lens= 1,750mm
Cloudy night + reflected
lights from buildings @120m



▲ 75m / Lens= 1,750mm
Cloudy night + reflected
lights from buildings @75m



▲ 25m / Lens= 50mm F4
Deep shadow - Starlight +
streetlight @20m



▲ 25m / Lens= 50mm F4
Deep shadow - Starlight +
streetlight @20m



▲ & ▲▲▲
50m / Lens= 75mm F5.6
Cloudy/Rainy night + building
lights @10m



▲ 50m / Lens= 75mm F5.6
Starlight



▲ 10m / Lens= 35mm F2.8
Window light @15m
+ Software enhanced plate

DVS's Ultra Miniature MICRO-ICCD is the World's smallest high resolution intensified camera with fully automatic gain management. The standard MICRO-ICCD is available in both CCIR and RS170 / EIA video formats and features a special version of DEP's ultra-high resolution XD4™ intensifier. The exceptionally small space envelope, low mass and uncompromising image performance offered by the MICRO-ICCD cameras make them the ideal choice for all size critical and covert surveillance applications.

The MICRO-ICCD is also available in modular un-housed form with remote head for OEM system integration. Special variants with profiled shapes for helmet mounted or body worn applications can be supplied to end-user specifications on request.

The standard MICRO-ICCD has fully automatic gain management for real "hands-free" operation from starlight up to a constant 40 lux face plate illumination. The gain management system gives excellent image quality over a very wide range of illumination with resolvable image detail observed with controlled illumination down to 10^{-6} lux face plate illumination.

24/7 MICRO-ICCD models with optional Auto-Iris lens control give 24 hour Day / Night operation, extending use to full bright sunlight. An advanced version of the MICRO-ICCD with a powerful digital automatic gain management system that can cope with the brightest scene illumination without any external light control mechanisms will be available from late in 2001.

- ▶ Standard MICRO-ICCD in one piece ruggedised housing: 76mm(l) x 60mm(h) x 49mm(w) and <250g weight (excluding power supply, lens and connecting leads).
- ▶ Optional Modular MICRO-ICCD:
 - ICCD Camera Head module: 39(dia) x 45(l) mm
 - Gating and HV Power Supply module: 40 x 25 x 14 mm
 - Electronics and Gain Management module: 69 x 48 x 45 mm
- ▶ Fully Automatic Gain Management gives "hands-free" operation. Control of exposure is via sophisticated algorithms adjusting **intensifier gain, video gain and intensifier gating** to give optimised image output.
- ▶ Standard Average Intensity exposure control monitors image brightness over the whole of the image - useful for general and automated night vision surveillance with a wide field of view and widely differing localised illumination conditions.
- ▶ Optional (Centre) Weighted Intensity exposure control - overall exposure is based on monitoring intensity in a defined sub-region (usually but necessarily the central area). Ideal for user-guided imaging where the camera is aimed so that most important part of the scene is in the (central) weighted area. Also for automated or static surveillance where bright lights at the edge(s) of the scene might otherwise bias exposure and lead to (large) underexposed image areas where important targets could be masked.



▲ 50m/Lens= 75mm f5.6
Starlight + window light
@55m



▲, ▲▲ & ▲▲▲
120m/Lens= 1,750mm
Cloudy night + reflected
lights from buildings @120m



▲ 10,000m/Lens= 2,500mm
Cloudy night



▲ 50m/Lens= 75mm F5.6
Cloudy/Rainy night + building
lights @50m



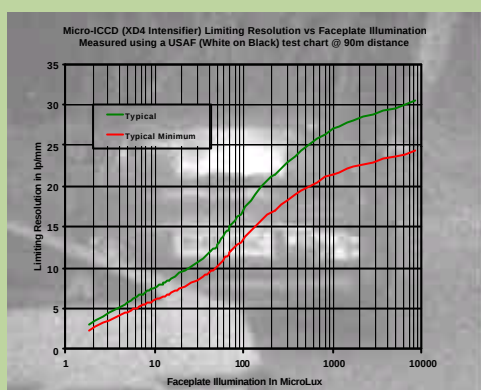
▲ 12,000m/Lens= 2,500mm
Cloudy night (bright spot is
red light on mast @ 15Km)



MICRO-ICCD - SENSITIVITY & RESOLUTION

THE MICRO-ICCD CAMERA has been proven in controlled testing to at least match the sensitivity and resolution of any currently available intensified video camera.

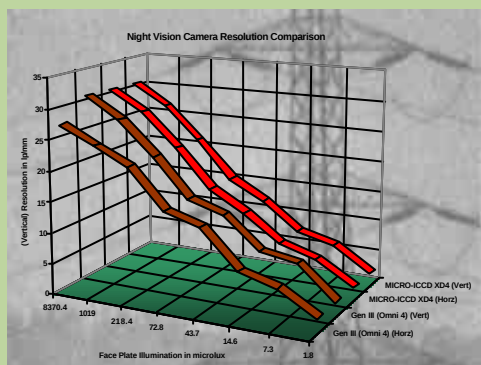
With DVS's MICRO-ICCD there is no need to compromise on performance to achieve the advantages of small size, low mass and operational flexibility. The MICRO-ICCD with XD4™ intensifier provides end-users with the highest level of practical performance available coupled to a very high level of over illumination and physical robustness to withstand the rigors of everyday use in the field.



The MICRO-ICCD cameras offer:

- ▶ Excellent spectral sensitivity from 380 - 900 nm
- ▶ High resistance to localised over illumination ("Burn-in")
- ▶ Small low intensity halos & great MTF for clean crisp imaging
- ▶ Low power consumption for longer operational deployment in the field
- ▶ Fast Gating & advanced GMS for rapid response & extended range

The Graph above and the Images in the panel right show the MICRO-ICCD's excellent resolution performance at different face plate illuminations. The images were acquired under controlled / spectrally calibrated illumination conditions with the USAF test image target viewed at a distance of 90 metres using a 2350mm lens (9" Celestron) with a nominal f10 aperture.

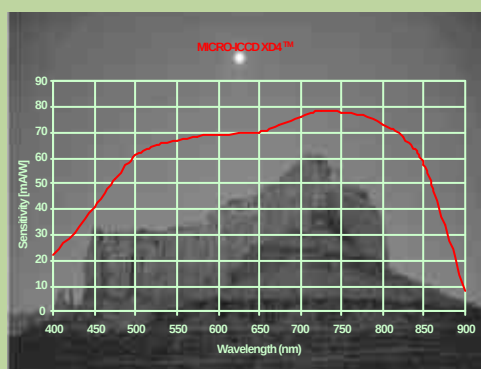


The Graph on the left shows the comparative resolution performance of the MICRO-ICCD (with an XD4™ intensifier) to a GEN III (GaAs) intensifier (Omnibus IV specification) equipped camera in an otherwise similar configuration. The comparison was carried out under the same imaging and resolution measuring conditions as for the MICRO-ICCD test results shown above and right.



MICRO-ICCD - SPECTRAL RESPONSE

The excellent spectral sensitivity and wide range response of the MICRO-ICCD, with XD4™ intensifier, is shown in the graph below. The MICRO-ICCD produces exceptional images in all Night Vision Applications whether the terrain is forest, desert, snow or even open water.



The MICRO-ICCD is also equally suited to high performance imaging in dull sunlight conditions and with all common sources of artificial light illumination (including those with a characteristic light output at the "blue" end of the spectrum).





MICRO-ICCD - SPECIFICATIONS

INTENSIFIERS - TYPICAL Specifications

Photocathode:	XD4™ Technology from DEP
Active Input Diameter:	11mm nominal used (2/3" lens format)
Input Window:	7056 Glass (AVG)
Output Window:	Coherent straight 1:1 (micro-) Fibre-optic
Output Phosphor:	P20 High Efficiency / Low Lag Formula
Intensifier gating:	Min Gate width <500 ns (typical Grade 1)
Wavelength Response:	380 - 900 nm
Gain @ 2×10^{-5} lux:	$50000/\pi$ cd/m ² /lux
Gain Range:	200:1 (typical) Controlled by GMS
Lifetime:	>10,000 hours (typical)

Parameter	Units	Grade 0 (Special)	Grade 1 (Standard)	Grade 2 (Option)
Signal to Noise ratio	ratio @ 108 microlux	>23	22	20
Horizontal Limiting Resolution @ 5% contrast	lp/mm	>64	64	58
Sensitivity 2856K @ 200V	microA/lm	730	>650	600
Spectral Response @ 800nm	mA/W	>66	>58	56
MTF (contrast) at				
7.5 lp/mm	%	85	82	79
15 lp/mm	%	73	65	60
25 lp/mm	%	52	50	40
E.B.I. (dark noise)	microlux	0.15	0.2	0.25
Halo size	mm	+/- 0.5	+/- 0.5	+/- 0.75

CCD Camera - TYPICAL Specifications

Optical Size:	2/3" (11mm diagonal - 4:3 format)
CCD Type:	High sensitivity, low dark current, HAD sensor with Electronic shutter
Active Pixels:	CCIR: 440K - 752(h) x 582(v) EIA / RS170: 380K - 768(h) x 493(v)
Pixel Unit Cell:	11.6µm (h) x 11.2µm (v) CCIR 11.6µm (h) x 13.5µm (v) EIA/RS170
Video Standards:	CCIR (625 lines, 50 Hz, 25 f.p.s.) EIA / RS170 (525 lines, 60 Hz, 30 f.p.s.)
Scanning:	2:1 Interlaced.
Sync:	Internal (crystal).
Gamma:	1 (0.45 option on special request)
Video Gain:	10:1 (typical) Controlled by GMS
Video Out:	1V p-p into 75Ω (with composite sync).
Optical Coupling:	Direct bonded via 1:1 (micro-) fibre optic to output window of intensifier for greatest sensitivity
S/N:	> 50 dB

GMS (Gain Management System) Performance

Faceplate Illumination:	10^{-6} lux (min) to 40 lux (max constant)
Overload protection:	Intensifier off @ >40 lux - Auto-reset after 10s
Scene Illumination:	Starlight to heavily overcast daylight (Standard) 24 Hour Starlight to full brilliant sun (with Auto-Iris lens options) 24 Hour Starlight to full brilliant sun (with digital GMS available from late 2001)
S:N Ratio:	Typically > 30dB @ 10^{-3} lux or greater
TV Line Resolution (typical):	>500 tvl per picture height @ 5×10^{-4} lux 460 tvl per picture height @ 3×10^{-4} lux 360 tvl per picture height @ 1×10^{-4} lux
Video output (GMS):	350 mV typical average signal for best visual image - adjusted to maintain visual quality for increased shot noise at low illumination.



MICRO-ICCD Camera - General Specifications

Power:	12V +/- 1.0V dc @ 230mA approx.
Lens Fitting:	C-mount (custom fittings on request)
Temperature Range	
Operating:	-30°C to +50°C -10°C to +40°C (full performance)
Storage:	-40°C to +50°C (Above and below these values may be subject to restrictions)
Shock resistance:	Nominally 50g - Details on request
Vibration tolerance:	Specification details on request
Conformity:	Housed units comply with European Safety and EMC directives
MICRO-ICCD Dimensions (excluding lens and connectors) - Standard:	76mm(l) x 60mm(h) x 49mm(w) Mass < 250 grams
Optional Modular:	
Camera head module:	39mm(dia.) x 45mm(l) incl. C-mount
G.A.P.S. module:	40mm x 25mm x 14mm
Drive & G.M.S. module:	69mm x 48mm x 45mm
Connector lengths:	Up to 230mm Head to Drive/GMS (up to 300mm on special order) Up to 300mm Head to GAPS (shorter lengths should be used where possible)

MICRO-ICCD OPTIONS:

Miniature control unit for manual control of Video Gain, Intensifier Gain & Intensifier Gating (switchable to automatic GMS control)



Additional Input & Output lines to provide status feedback from MICRO-ICCD, control of external light limiting mechanism and external override of GMS control via user supplied control signals.

Special options include:

Lenses (including Wide Angle, Telephoto & Zoom with motorised control options), Auto-Iris Lenses & connections; Custom Housings (for Helmet / Body worn applications); Environmental Protection; Special Acceptance Testing Protocols; Specific Connectors; Alternative Lens Mountings; Viewing Goggles; RF / Microwave transmitter / receiver (encryption options available); Compact Digital Image Storage / Recording; Special Exposure Control / Modified GMS systems; PC based Image Acquisition / Enhancement / Analysis & Archiving; Tuned Wavelength Response.



DEP

XD4™ Technology from
Delft Electronic Products



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