



**EMCCD - GEN III**  
**A NEW GENERATION**

*The Photon Harvester!*

## History and development of EMCCD Technology – What is Gen III?

The first EMCCD (Electron Multiplying CCD) sensors were launched on the market in the early 1990s by e2v and Texas Instruments (TI). These sensors offered a new dimension in imaging that effectively eliminated read noise from an image sensor, enabling the required the combination of extreme sensitivity and fast frame rates needed for advanced ultra-low light applications.

Over the years we have witnessed further advances in this technology. Both e2v and TI released Gen II sensors in the late 1990s which offered improved imaging performance and EMCCD has remained the best sensor for low light imaging ever since. Several manufacturers adopted these sensors into camera solutions, including Raptor Photonics.

Now Raptor Photonics is delighted to announce the next generation in EMCCD technology. EMCCD – Gen III is available in its latest camera, the Falcon III. Based on the very latest in sensor technology from e2v, it offers high-resolution, smaller pixels, faster speeds without overclocking and lower voltages on the EM gain register. This reduces any degradation and aging of the EM gain associated with previous generations of EMCCD cameras.

Welcome to the next generation of EMCCD offering scientists to most sensitive imaging solution available today. Welcome to the Photon Harvester!

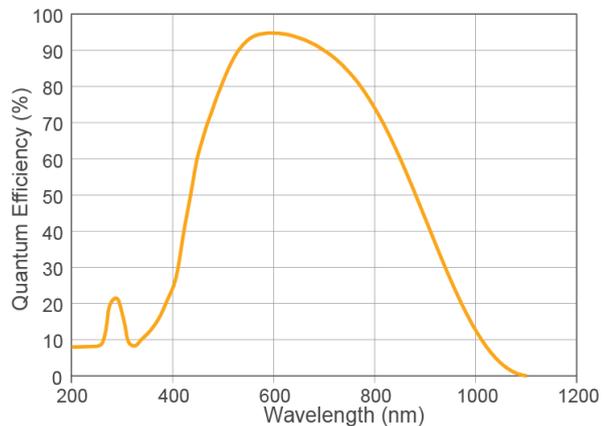
Technology	Time (Circa)	Sensor suppliers	Features	Sensor offerings	Raptor Cameras
Gen I	1990s	e2v, Chelmsford, UK <a href="http://www.e2v.com/">http://www.e2v.com/</a>  Texas Instruments, Japan <a href="http://www.ti.com/">http://www.ti.com/</a>	Early stage and ground-breaking read-out noise reduction for low light imaging	<b>e2v</b> CCD65  <b>TI</b> 253	
Gen II	2000s	e2v, Chelmsford, UK <a href="http://www.e2v.com/">http://www.e2v.com/</a>  Texas Instruments, Japan <a href="http://www.ti.com/">http://www.ti.com/</a>	Front and back illuminated. Better sensitivity with deep cooling. Reduced cross-talk, Reduced noise, Reduced clock induced charge  Front illuminated only Faster speeds	<b>e2v</b> CCD216 CCD201 CCD60 CCD65 CCD220 CCD97  <b>TI</b> TC247  TC285  TC367 TC365 TC713	Hawk 216 Falcon II Kestrel  Merlin, Kite Hawk 247  Falcon I
Gen III	2010s	e2v, Chelmsford, UK <a href="http://www.e2v.com/">http://www.e2v.com/</a>	Larger resolution - 1MP with small pixels – 10um Faster full resolution frame rates of 40 frames per second  Lower voltages for reduced ageing effects	<b>e2v</b> CCD351	Falcon III

## Falcon III

The Falcon III offers a vacuum sealed, TEC deep cooled 1MP back-illuminated EMCCD camera capable of running at up to 34fps in full frame with less than 0.01 electron in read noise, with 10 $\mu$ m pixels and a wavelength range extending from the UV to the NIR.

The Falcon III EMCCD is based on e2v's next generation CCD-351 back-thinned 1" sensor. It combines high sensitivity, speed and resolution with QE up to 95%.

- Lower noise: <0.01e- read noise
- Faster readout: x3 faster than previous generations
- Higher EM gain: up to x5000 with lower voltages
- Colder: cooling down to -100°C for minimal background events
- Ultimate QE: up to 95% with back-illuminated sensor



*Only EMCCDs can deliver the raw sensitivity required for the most light starved conditions, and the key application benefits that this unlocks.*

To find out more about Gen III EMCCD technology or to book a demo of the Falcon III EMCCD camera please contact us on [sales@raptorphotronics.com](mailto:sales@raptorphotronics.com)