

OXYGEN® RD0033

Dual-Band, Dual-Polarity

8 μm Pitch, 640 x 512 DROIC

The Oxygen® RD0033 is an advanced off-the-shelf DROIC with cutting-edge performance that can be used with any industry-standard direct-injection compatible detector technology to enable low SWaP-C systems. The solution was designed to optimize FPA performance through state-of-the-art integrated features and multiple operating modes that offer flexibility for a wide range of high-performance application requirements.

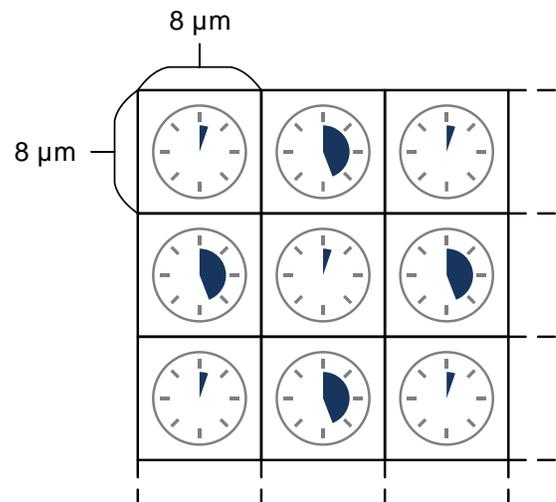
Features

- ◆ 8 μm dual-gain pixels with 260 ke- or 3.4 Me- capacity
- ◆ Low-power direct injection detector bias for both polarities
- ◆ Dual-band (2-color) or single-band operation
- ◆ Integrate-while-read and integrate-then-read operation
- ◆ Asynchronous or synchronous global shutter (snapshot)
- ◆ High dynamic range (>120 dB)
- ◆ 14-bit column-parallel conversion
- ◆ Over 700 fps at full frame, serialized to 16-bits/pixel
- ◆ Unlimited 32 x 32 windows at 8,895 fps per window
- ◆ Selectable 2, 4 or 8 LVDS output ports
- ◆ SPI control interface (SenSPI®) and on-chip PLL

High Dynamic Range Dual-Integration Capability

The Oxygen RD0033 can run two different integration times simultaneously on a checkerboard pattern of pixels across the array. This mode leverages the small 8 μm pitch focal plane sampling to achieve high dynamic range without loss of event data for infrared systems with typical Airy disk diameters.

The diagram below illustrates a segment of an array of 8 μm pixels with a graphic representation of the pixel well capacity. Each adjacent pixel has accumulated a different level of charge by operating in the High Dynamic Range Dual Integration mode.



Advanced Operating Modes

Readout Oversampling

The high-speed readout engine may be used to achieve superior low-noise performance through readout oversampling. Each row is oversampled by a programmable number of samples and the uncorrelated read noise will improve by the square root of the oversamples.

Sample-up-the-Ramp

For very low signal, stable scenes and long integration time, the DROIC can perform multiple readouts without resetting the pixel array. This performs a sample-up-the-ramp operation and provides another method to improve signal-to-noise ratios.

Choice of Frame and Integration Control

There are a wide range of control features including free-run mode, command word trigger or external asynchronous integration and readout clock. In the asynchronous case, the start and stop of integration time are completely asynchronous with only a propagation delay between clock input and pixel operation.

External Correlated Doubling-Sampling

High-gain mode utilizes correlated double-sampling (CDS) to remove the reset noise from the small integration capacitors. The DROIC provides sequential reset and signal frames for external CDS at the flip of a bit.

Multiple High-Speed Windows

The integrated signal may be held over multiple readout frames, enabling multiple windows per frame. Coupled with the high-speed readout engine, this allows very high-speed interrogation and tracking of objects and events.

Availability and Contact Information

Part number: RD0033-Do80-WS

Available unit: full wafer

Contact sales for pricing information and availability:
products@senseseeker.com

Oxygen® Family Compatibility

The RD0033 DROIC is a 640 x 512 array size version of the existing commercial 1280 x 720 Oxygen RD0092 in a smaller form factor. It is cross-compatible with the RD0092 using the same command, control and data mapping interface, with identical supplies. This allows the same electronics and software to be largely reused across both products. The intention of the product family concept is to reduce development complexity for designers that create infrared imaging cameras in a range of pixel array format sizes.

Applications

The Oxygen RD033 is designed to be used in a range of applications that require a cost-optimized small form factor infrared camera. The dynamic range of such cameras can be significantly improved through the innovative dual-integration mode that is available on the Oxygen RD0033. These applications include surveillance/reconnaissance,IRST, situation awareness, chemical and contaminant detection, inspection and other industrial machine vision uses.



Size, Weight, Power Consumption

The compact 640 x 512, 8 μ m pitch DROIC is ideal for small form factor designs that require low power operation. The 8.84 mm x 8.28 mm die size enables form factor minimization of the camera. Power consumption is optimized throughout the DROIC design. The RD0033 is expected to consume <60 mW at 60 fps. A phase-locked loop (PLL) has been added to reduce external clocking requirements. The PLL is supplied by a 25 MHz source.

The information detailed on the RD0033-D080 in this preliminary product brief is provisional and is subject to revision.
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