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Ultra-compact high performance MCT MWIR engine

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Size, weight and power (SWaP) reduction is highly desired by applications such as sights for the dismounted soldier or small gimbals for UAVs. But why have high performance and small size of IR systems inevitably exclude each other?

Namely, recent development progress in the fields of miniature cryocoolers, short dewars and high operating temperature (HOT) FPAs combined with pitch size reduction opens the door for very compact MWIR-modules while keeping high electro-optical performance.

Now, AIM has realized first prototypes of an ultra-compact high performance MWIR engine in a total volume of only 18cl (60mm length x 60mm height x 50mm width). Impressive SWaP characteristics are completed by a total weight below 450g and a power consumption of only ~4W in basic imaging mode. The engine consists of a XGA-format (1024x768) MCT detector array with 10 μ m pitch and a low power consuming ROIC. It is cooled down to a typical operating temperature of ~160K by the miniature linear cryocooler SX020. The dewar uses a short coldfinger and is designed to reduce the heat load as much as possible. The cooler drive electronics is implemented in the CCE layout in order to reduce the required space of the printed boards and to save power. Uncorrected 14bit video data is provided via Camera Link. Optionally, a small image processing board can be stacked on top of the CCE to gain access to basic functions such as BPR, 2- point NUC and dynamic reduction. This paper will present the design, functionalities and performance data of the ultra-compact MCT MWIR engine operated at HOT.

Keywords: MCT, IR-engine, small pitch size, XGA 1024x768, high operating temperature, MWIR, SWaP, ultra-compact

Short version:

Recently, AIM has realized first prototypes of an ultra-compact high performance MWIR engine in an overall volume of only 18cl (60mm x 60mm x 50mm). Impressive SWaP characteristics are completed by a total weight below 450g and a power consumption of only ~4W. The engine consists of a XGA-format (1024x768) MCT detector array with 10 μ m pitch and a low power ROIC. It is cooled down to a typical operating temperature of ~160K by the linear miniature SX020 cryocooler. Uncorrected video data are provided via Camera Link. Optionally, access to basic image processing functions is available via a small stackable board. This paper will present the design, functionalities and performance data of the ultra-compact MCT MWIR engine operated at HOT.