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Optimized MCT IR-Modules for high performance imaging applications

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ABSTRACT

In today's typical military operations situational awareness is a key element for mission success. In contrast to what is known from conventional warfare with typical targets such as tanks, asymmetric scenarios now dominate military operations. These scenarios require improved identification capabilities, for example the assessment of threat levels posed by personnel targets. Also, it is vital to identify and reliably distinguish between combatants, non-combatants and friendly forces. To satisfy these requirements, high-definition (HD) large format systems are well-suited due to their high spatial and thermal resolution combined with high contrast. Typical applications are sights for long range surveillance, targeting and reconnaissance platforms as well as rotorcraft pilotage sight systems.
In 2012 AIM presented first prototypes of megapixel detectors with 1280x1024 elements in a 15µm pitch for both spectral bands MWIR and LWIR. The modular design allows integration of different cooler types, like AIM's split linear coolers SX095 or SX040 or rotary integral types depending whatever fits best to the application. Large format FPAs have been fabricated using liquid phase epitaxy (LPE) or molecular beam epitaxy (MBE) grown MCT.
To offer high resolution in a more compact configuration AIM started the development of a 1024x768 10µm pitch IR-module. Keeping electro/optical performance is achieved by a higher specific charge handling capacity of the readout circuit (ROIC) in a 0.18µm Si CMOS technology. The FPA size fits to a dewar cooler configuration used for 640x512 15µm pitch modules.

The paper will present the development status and performance of large format IR-modules at AIM with small pixel pitch integrated in compact dewar cooler configurations.

Keywords: MCT, IR-Module, large format, LWIR, MWIR