

Dual Band Focal Plane Array (FPA) Manufacturing (DBFM)

Demonstrate manufacturing processes to produce large format, small pixel, dual band staring FPAs simultaneously operating in the midwave infrared (MWIR) and longwave infrared (LWIR) regions.

OBJECTIVE / SOLUTION

Affordable simultaneous dual band Focal Plane Array (FPA) technology is required to support the Future Combat Systems (FCS) objective capabilities for high performance ground and air sensors. The key objectives of this program are to develop and demonstrate manufacturing processes to produce these large format, small pixel, dual band staring FPAs simultaneously operating in the midwave infrared (MWIR) and longwave infrared (LWIR) regions. The overall goal is to achieve a 10X reduction in the unit cost of the FPAs. The Dual Band Focal Plane Array Manufacturing (DBFM) program will identify fabrication processes that are cost drivers in the manufacture of large format, small pixel, simultaneous dual band FPAs and implement improvements in the processes to reduce these costs.

ACHIEVEMENTS

- Conducted molecular beam epitaxy (MBE) growth on increased substrate size of 25 cm² achieving yields of >80%.
- Reduced the number of layers stitched from 50% to 20% for 1280x720 format read-out integrated circuit (ROIC).
- Demonstrated hybridization yields of >70% for 640x480 format FPAs.
- Achieved FPA final acceptance test yields >50% for 640x480 format FPAs.
- Delivered first 640x480 format FPAs from Baseline Lots (Raytheon Vision Systems [RVS] & Rockwell Scientific Company [RSC]).
- Conducted first MBE growth of HgCdTe on 6x6 cm² size CdZnTe substrates (RVS).
- Fabricated first 1280x720 format FPAs (RVS).
- Conducted first MBE growth of HgCdTe on 7x7 cm² size CdZnTe substrates (RVS).
- Completed all MBE growth of all wafers intended for Small Pixel Lot processing.
- Achieved >99% hybridization interconnect operability (RVS).

BENEFITS

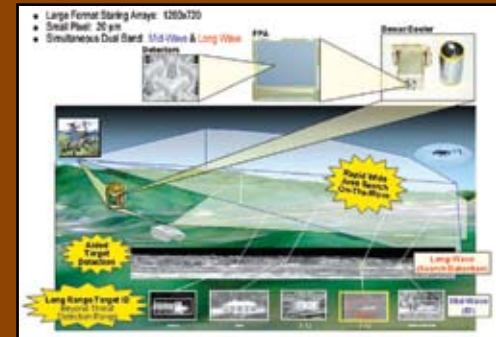
- Provides combat overmatch: Warfighter can identify threat before they can even detect his presence, See First/Act First.
- Increases survivability: Warfighter can rapidly search wide areas while on-the-move with improved standoff.
- Reduces crew burden: Warfighter fatigue is decreased through aided search and detection for surveillance tasks and difficult/obscured targets with shorter target reporting timelines.

STATUS

- Completed validation testing of 640x480 format ROIC (RSC).
- Completed validation testing of 640x480 format Detector Interface Boards [DIB] (RSC).
- Completed Baseline and Program 1 Lots (RVS & RSC).
- Conducted first DBFM Industry Review 10-11 May 05.
- Completed validation testing of 1280x720 format ROIC (RVS).
- Completed validation testing of 1280x720 format DIB (RVS).
- Completed CDR for 1280x720 format ROIC (RSC).
- Completed CDR for 1280x720 format DIB (RSC).
- Program Lot 2 on-going (RVS & RSC).
- MBE growth experiments on-going to reduce defects, increase bake stability.
- Dry etching experiments on-going to improve processing of small pixels.
- Hybridization experiments on-going to improve interconnect operability.
- Testing of 640x480 FPAs on-going for insertion into tactical demonstration systems (RVS, RSC).

WEAPON SYSTEMS / SECONDARY ITEMS IMPACTED

- Future Combat Systems (FCS) Incremental Spirals (Reconnaissance & Surveillance Vehicle, Mounted Combat System, Unmanned Aerial Vehicles)
- AH-64 Apache Helicopter
- Long Range Advanced Scout Surveillance System (LRAS3)
- Armed Reconnaissance Helicopter (ARH).



DBFM enables affordable, high performance ground and Air IR sensor systems with rapid wide area search, long range ID, and dual band multi-spectral aided target detection capability against difficult targets while on-the-move.



Long Range Advanced Scout Surveillance System (LRAS3)

