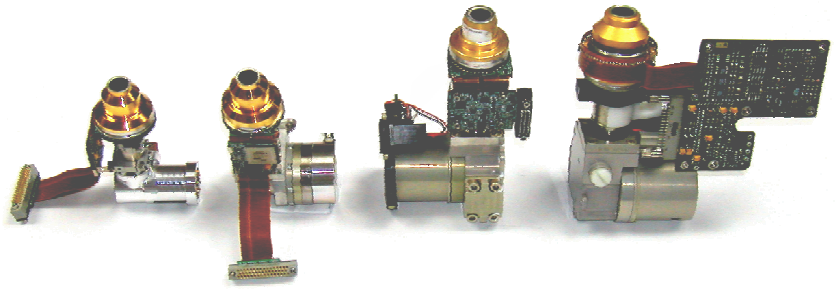
COMPANY PROFILE
2009

PRODUCT LINES

IR DETECTORS

COOLED

InSb
MCT
ABCs



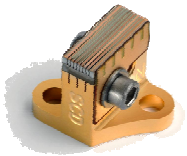
UNCOOLED

VOx

LASER DIODES

QCW

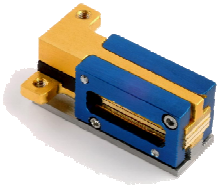
Conductive cooling



CW

Conductive cooling

Active cooling



SemiConductor Devices

COMPANY FACTS

OUTLINE

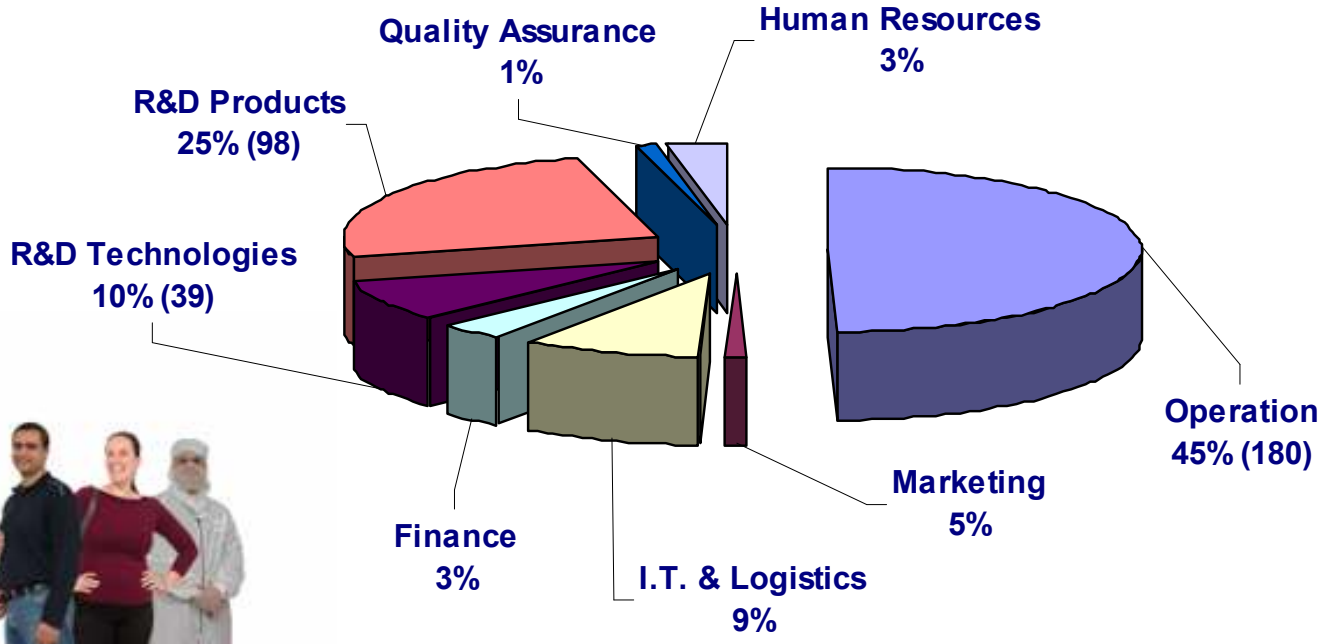
- Established in 1987
- Partnership of RAFAEL and ELBIT
- Products: IR Detectors and Laser Diodes
- ~ 420 employees
- Sales: 126M$ (2008)
- 2400 sqrm clean rooms (+ 700 sqm in construction)
- Fully Owned subsidiary in the US

ASSETS

- InSb, MCT and VOx detectors
- Largest supplier of 2D arrays Worldwide
- Integrated R&D and Production Facility
- Application oriented products
- Crystal growth: LPE, MBE and MOCVD
- ISO 9001, OHSAS 18001, ISO 14001

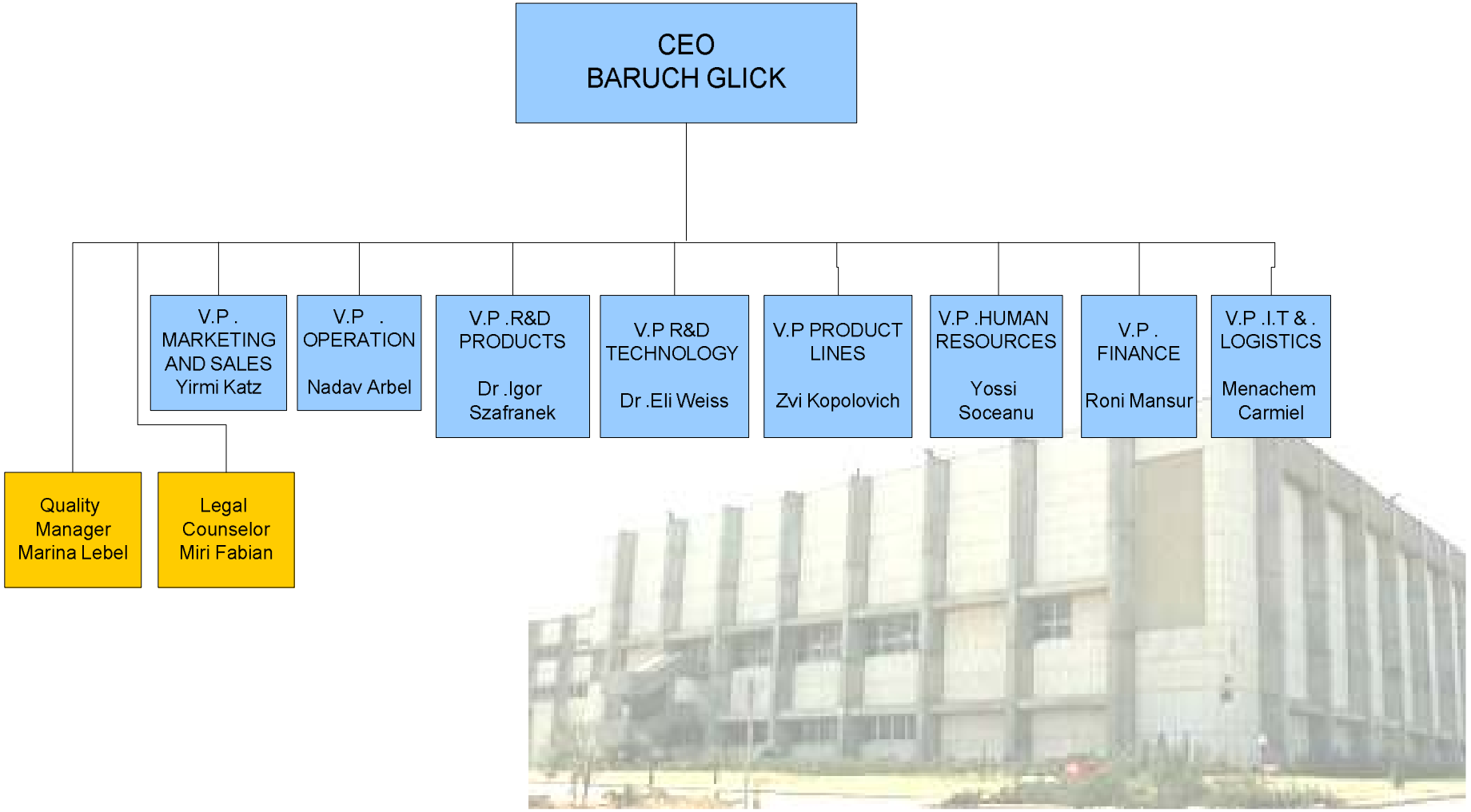
SemiConductor Devices

OUR PEOPLE

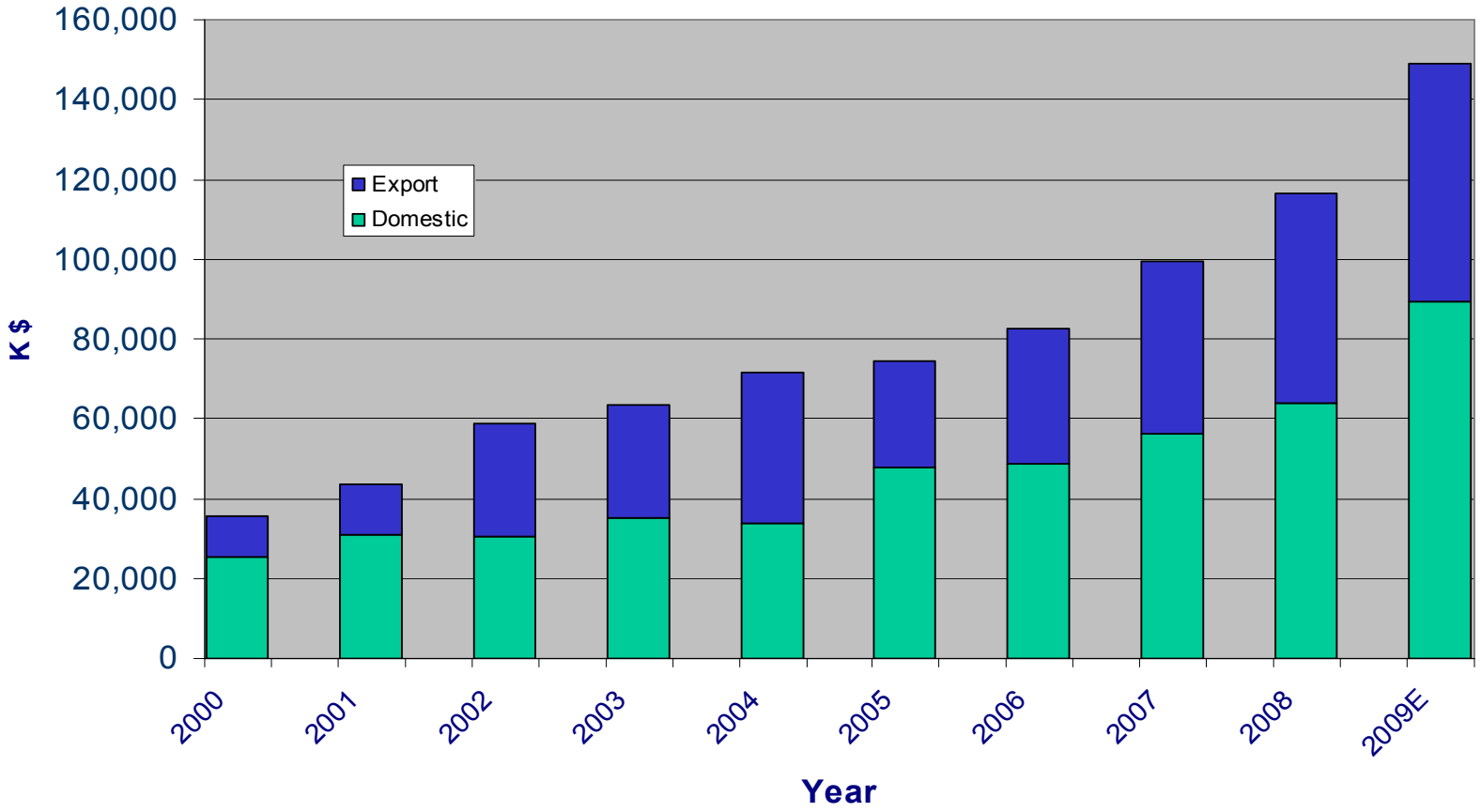


422 Employees + 40 Students

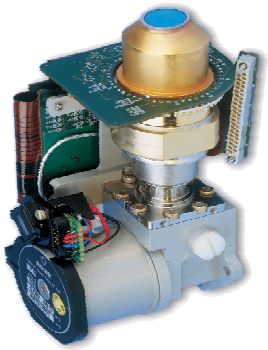
ORGANIZATION TREE



Sales distribution for years 2000-2009 (K$)



High End Applications

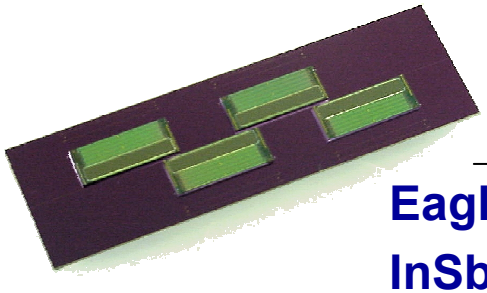


Sebastian 640
InSb 640 x 512

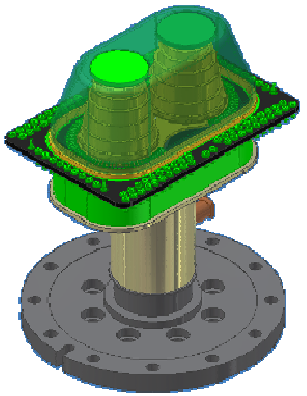
Blue Fairy
InSb 320 x 256

Falcon - Flamingo
InSb 640 x 512

- Long range Surveillance
- Reconnaissance
- Space
- UAV's
- IRST
- MWS
- Navigation Pods, etc



Eagle
InSb 2048 TDI



DUON
InSb 480 x 384 x 2

SemiConductor Devices

High End Applications

SemiConductor Devices

Medium End Applications

- Hand Held
- Weapon Sights
- FCS
- EVS
- DVAs, etc

Analog Pelican
InSb 640 x 512

Piccolo “c”
InSb 320 x 256

MCT 288 x 4

BIRD 640/384
VOx 384 X 288
VOx 640 X 480

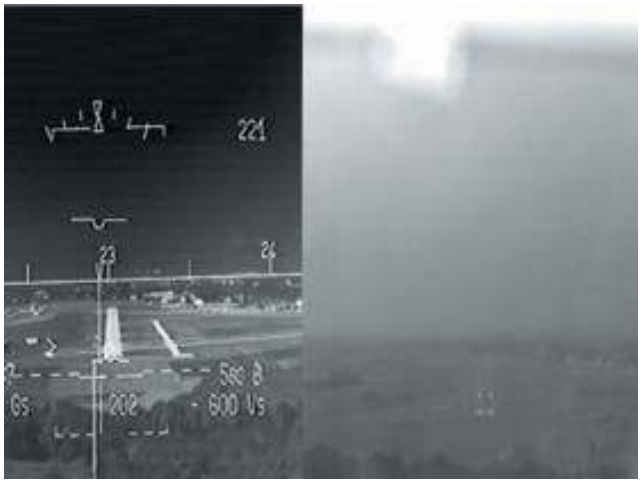
Sebastian 320
InSb 320 X 256

GALI
InSb 480 X 384

Mini GALI
InSb 480 X 384

SemiConductor Devices

Medium end Applications



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LASER DIODES

QCW – Quasi Continuous Wave
60 to 480 watts @ 56A

QCW – Quasi Continuous Wave
800 watts @ 120 A

PCCW
Passive Cooling Continuous Wave

ACCW
Active Cooling Continuous Wave

ACCW
Active Cooling Continuous Wave

SemiConductor Devices

NEW PRODUCTS 2009

SemiConductor Devices

HERCULES
InSb 1280 x 1024, 15µm pitch

Description

- 15 µm pitch InSb process.
- 0.18 µm Si-CMOS ROIC Process.
- "***Sebastian*" compatible DIGITAL ROIC Architecture.**
- Compact, Stiff dewar
- **Compact and light Integral rotary Stirling cooler.**

Main Features

- 120 Hz Frame Rate at full window
- Improved long-term NUC stability
- Camera Link interface
- Faster, better linearity and residual non-uniformity
- Lower noise at system level
- Reduced component volume and power consumption

Applications

IRST ,MWS ,Long Range Surveillance, Navigation Payloads, Reconnaissance

HERCULES
InSb 1280 x 1024, 15µm pitch

Typical Specifications

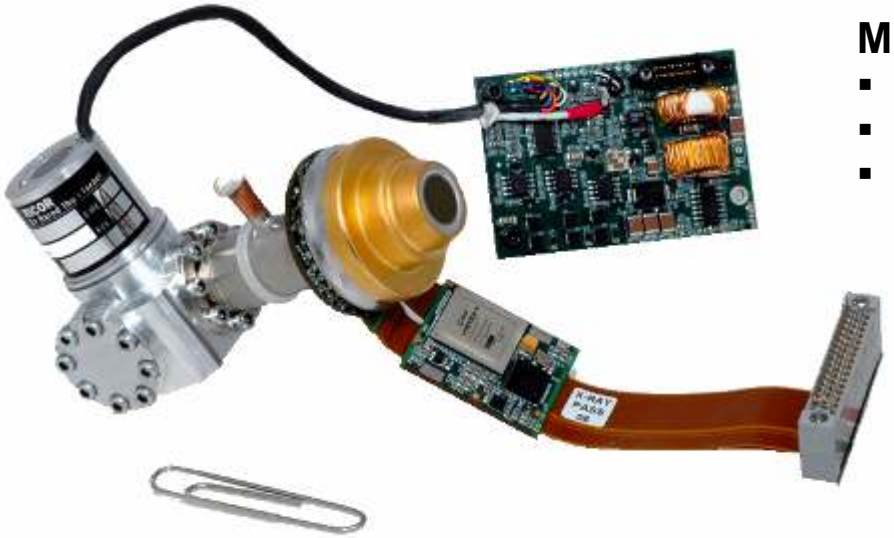
PARAMETER	PERFORMANCE
Integration modes	ITR/IWR/Proprietary Integration Modes
Pixel capacity	6Me-
Maximum frame rate	
@ 13 BIT resolution	100 F/S @ Full window 120 F/S @ 1024 x 1024
Power dissipation	<80mW@60 Frame/Sec <130mW@120 Frame/Sec
Digital resolution	Up to 15bit
Readout mode	Normal/ Dilution
Windowing	Flexible at selectable region of interest
Readout direction	Top to bottom
NETD	20mK@50% well fill capacity
Residual Non Uniformity (typ)	<0.04% STD/DR@10-90% well fill capacit
Response uniformity	<2.5% STD/DR
Standard Cooler	Ricor 0.5W K508 / 0.75W K548

SemiConductor Devices

MINI GALI
Epi-InSb 480 x 384, 20µm pitch

Description

- The powerful ***Sebastian 480*** DIGITAL ROIC
- Novel ***EPI-InSb*** technology, that allows the FPA to operate at temperatures above 90K with same performances as in 80K
- The compact 0.25W Ricor K562 mini Stirling cryocooler



Main Features

- Light weight, long vacuum-life Dewar
- Low power proximity electronics including FPGA
- Easy to integrate Camera Link interface

Applications

- Light payloads for mini UAVs
- Hand Held Thermal Goggles
- Personal Thermal Weapon Sight
- Missile seekers
- Situation awareness

SemiConductor Devices

MINI GALI
Epi-InSb 480 x 384, 20µm pitch

Typical Specifications

PARAMETER	PERFORMANCE
NETD	< 20mK @50% well fill
Pitch	20 µm
Waveband	3.6-4.9 µm
Cold shield F#	F/4
Cooler	0.25W Ricor K562
FPA Temperature	> 90K
Pixel capacity	7 Me−
Windowing	Flexible at selectable region of interest
Linearity	< 0.06% of full output range
Uniformity after 2 P.C.	< 0.06% of full output range
Operating modes	ITR/IWR/plus Proprietary Integration Modes
Frame rate @ full window	30/60 Hz
DDC power consumption	< 4W@23°C ambient (typical @ 90K FPA temp)
DDC weight	< 275g
Cool down time	< 7 min@23°C
Data Resolution	13 bit

SemiConductor Devices

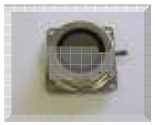
BIRD 640
VOx, 25µm pitch

Main Features

- “Power Save” and “TEC-less” operation ready.
- “Instant On” operation mode.
- On UFPA, ambient induced residual non
- uniformity correction feature.
- On UFPA, residual non uniformity prediction feature.
- Optional “Fast” detector (T.C. 5 msec.).

Applications

- Goggles
- Unattended Sensors
- Remote Weapon Stations
- Miniature Payloads
- Airborne EVS
- Security and mid range Surveillance



SemiConductor Devices

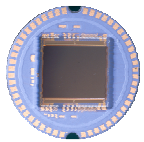
BIRD 640
VOx, 25µm pitch

Typical Specification (@ 25C, TEC stabilized)

PARAMETER	PERFORMANCE
Spectral Bandwidth	8-14 µm
Pixel Operability	99%
Maximum Frame Rate	60 Hz for full format @ 2 video outputs
Voltage	5 Volts Max
Power Dissipation (excluding TEC)	450 mW for full format
Output Range	2.5 ± 1.75 Volts
Output Mode	Single-Ended
Intra-scene Dynamic Range @ f/1	>100 K (16 selectable gain options)
Thermal time constant	< 12 msec
Signal Responsivity @ f/1	> 15 mV/K
NETD @300K scene, f/1, 60 Hz	< 50 mK
Raw offset Non-Uniformity	< 400 mV p-p (on chip coarse NUC)
Video Outputs	1 or 2
FPA Temperature sensor	On chip
Ambient temperature	-40C to + 70C
FPA temperature	-35C to +65C
Vacuum integrity	> 15 years
Package sensor weight	~ 40 gr.

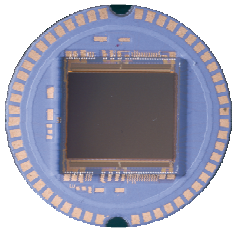
SemiConductor Devices

MWIR 2-D FPA Roadmap

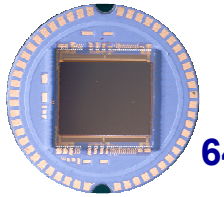


Sebastian 320
320×256
2007

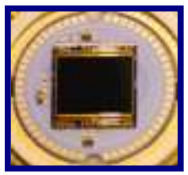
epi-InSb (MW)
Temp ≈ 95K
Pitch ≥ 20 µm
2008



Hercules
1280×1024
InSb FPA
2008

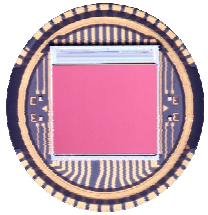


Sebastian
ROIC Rev-B
2009

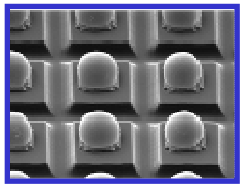


640×512/15 µm
SCD ROIC
2009

epi-InSb
SW/MW
≤15 µm
2009-10



SNIR
See-Spot
SWIR/MWIR
2009-10

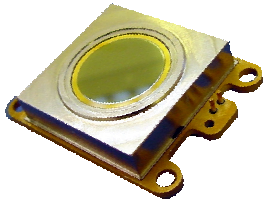


x-B-n (4.2 µm)
BLIP ≥ 150K
2010-11

- Dates indicate 1st-run prototype
- In production - one year later

SemiConductor Devices

Uncooled VOx µ-Bolometer Roadmap



384×288/25 µm
NETD<50 mK @ 60 Hz
2005

640×480/25 µm
NETD<50 mK @ 60 Hz
2007

120 Hz Detector
2007

High Sensitivity

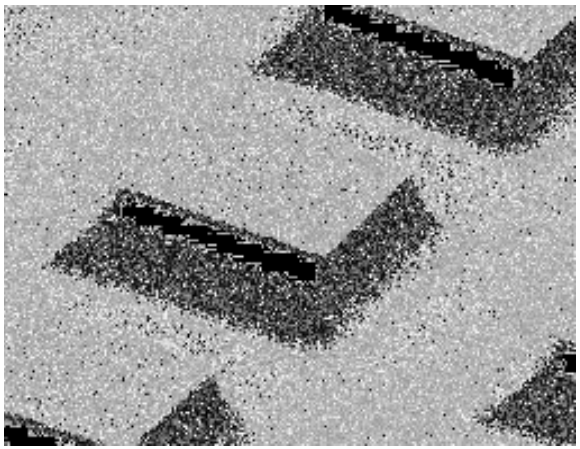
384×288 & 640×480/25 µm
NETD<25 mK @ 60 Hz
2008

TEC-less?
MWIR/LWIR?
2008÷9

640×480/17 µm
NETD<50 mK @ 30 Hz
2009-10

SemiConductor Devices

Epitaxial Antimonides FPA Roadmap



MWIR&LWIR Dual-Band
InAs/InGaSb SL
201X

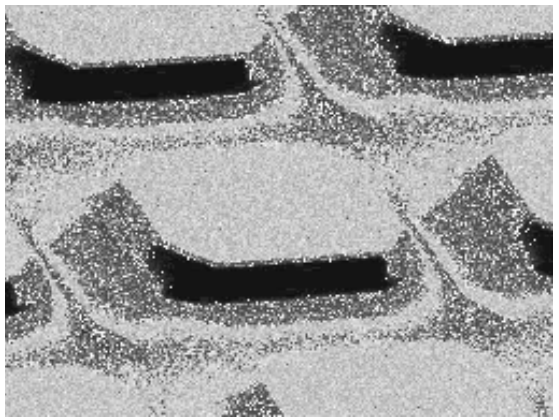
LWIR 2-D PV FPA
InAs/InGaSb SL
201X

Two-Color in MWIR
InAs/InGaSb SL
201X

ABCS X-B-n (4.2 μm)
FPA Temp ≥ 130K
2010÷11

epi-InSb (MWIR)
FPA Temp ≈ 100K
2006

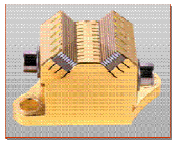
HOTMWIR
DARPA Program



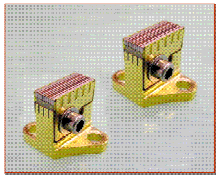
SemiConductor Devices

High Power Laser Diode Roadmap

QCW bars
1997



8- QCW bar
Robust head stack
60 W/bar
1999



US Army
qualified
2000

Collimated
800 W stack
2003

Lens
attachment
technology

CW bars
40W
808 nm
2004

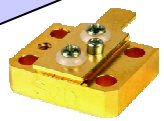
Microcooler
based stacks
CW

2005

QCW bars
100 W/bar
808 nm
Al - Free
2005

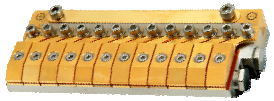
Fiber coupled
diode laser
40 W
2006

CW bars
80W
808 nm
2006

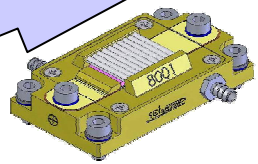


ZOFAR
Tap water
cooling
2007

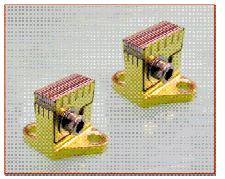
CW Stack
1 kW
2006



High Duty Cycle
QCW
940 nm
150 W/bar
2008



QCW Stack
808 nm
55% Eff.
2008



QCW Stack
808 nm
150 W/bar
2009

10 W Single
Emitter
FC
2009