Image Sensor Solutions

Overview Presentation
Worldwide Image Sensor Markets

Source: TSR, Strategies Unlimited, IDC, ISS, CDG
Image Sensor Solutions

• World leader in image sensor design & development
  – 25+ years CCD experience
  – Leader in high performance CCDs
  – 15+ years CMOS design experience

• CCD and CMOS manufacturing capabilities
  – CCD manufacturing in EK Rochester Fab
  – CMOS via foundry relationships

• Strong IP position

• Worldwide sales and engineering support
Kodak Image Sensors
Continuous Leadership

Bayer Pattern Array (Kodak Patent – 1975)
World’s First Prototype Camera (1976)

First Consumer Camera Apple QuickTake (1994)
Mars Rover Camera (1997)


First Megapixel Sensor (1986)
First 22 Megapixel Sensor (2002)
39 Megapixel Sensor (2005)

Foundation CIS Patent 4T-Pinned Diode
On-chip CMOS charge binning

300+ CCD/sensor patents, 70+ CMOS sensor patents
A Unique Business for Kodak

• Vertical business structure
  – direct sales force
  – integrated manufacturing

• Driven by “design wins”

• Selling process targets engineers

• Longer cycle to revenue

• Driving the technology is the top priority
  – innovation favors creative marketing
Image Sensor Types

- **CCD**
  - Traditional image sensor devices
  - Specialized manufacturing process
  - Typically has higher image quality
  - Used in consumer DSC, industrial, scientific applications

- **CMOS Image Sensor (CIS)**
  - Growing market penetration
  - Uses more common manufacturing platforms
  - Enables greater on-chip integration, lower power consumption
  - Mobile and D-SLR applications today
Kodak ISS Key Strategic Initiatives

- Drive profitability as the leading supplier of CCD image sensors into high performance imaging markets.

- Accelerate profitable growth and drive scale by offering differentiated CMOS sensor products into consumer imaging markets.

- Be a key component supplier supporting Kodak’s digital initiatives in consumer DSC and mobile applications by delivering differentiated, cost effective CMOS sensors.
Markets for Kodak Image Sensors

- Digital Cameras
- Camera Phones
- Automotive

- Industrial Vision
- Scientific
- Medical
Photokina 2006

Kodak 39 Megapixel CCD Sensor

Kodak 10 Megapixel APS CCD Sensor

Kodak 10 Megapixel 4/3 CCD Sensor

Hasselblad H3D Medium Format D-SLR

Leica M8 35mm D-SLR

Olympus E-400 4/3 Format D-SLR
ISS CCD Capabilities

- CCD Wafer Fabrication Facility
  - 15,000 sq. ft. clean room (Class 10 / 100)

- On-site CCD Packaging and Test operations

- Flow refined for production of “specialty” CCD products
  - “Large pixel” devices (>4um pixel geometry)
  - Ultra-low dark current
CCD Sensors

- Excellent image quality
- Nominal power consumption
- Requires external circuitry
- Nominal cost
- Larger camera size

CMOS Sensors

- Good image quality - improving rapidly
- Lower power consumption
- Highly integrated
- Lower cost
- Smaller camera size
Kodak’s Winning Strategy for CMOS

- Deliver Kodak imaging expertise in silicon
- World class image sensor capability
- Leverage corporate partnerships
- Innovation and design leadership

Pixel → Sensor → Camera Module
Kodak ISS - West

- Acquisition of NSC Imaging team completed September 2004

- Key skill sets added for circuit design & commercialization

- Beneficial Silicon Valley presence

Sunnyvale, CA
Enhanced System-on-a-Chip Image Processing

Diagram showing various components and functions, including:

- Enhanced Noise Cleaning
- High Speed Serial I/F (MIPI)
- DSC Class Color Processing
- 8051 uController
- PLL
- I2C Compatible Serial I/F
- POR
- Power Control
- CLK Gen
- Anti Flicker
- mclk
- sclk
- sda
- reset
- Column CDS
- APS Array
- Row Address Decoder
- Horizontal Register
- Smart μCamera Controller
- Digic Video Interface
- d[9:0]
- pclk
- hsync
- vsync

The diagram illustrates the integration of these components for enhanced image processing capabilities.
CMOS Sensor Growth Opportunities

Consumer Digital Cameras

KODAK SENSOR

Lens Partner

Module Partner

Chipset Partner

Camera Phones
Automotive Imaging

- Lane Departure Warning
- Advanced Collision Warning
- Blind Spot Detection
- Rear View
- Internal Viewing
- Black Box

KAC-9619 Blind Spot Information System
Volvo 2006 Models

KAC-9619 Advanced Warning
Mobileye Aftermarket Product
Cameras Anywhere / Everywhere

Automotive

Medical

Security & Surveillance
Kodak Image Sensor Solutions