INET
Industry Leading Imaging Solutions
August 2020
INET Introduction

INET is a Disti-Rep company, focused, as our suppliers, on Camera Modules solutions & Peripherals.

Established in 2008 by Ilan Eliezer, 20 years semiconductor sales experience, INET become main Camera Module supplier among Israel’s largest companies with special focus on Startups industry and new projects in wide range of applications.
INET is supporting customers from the block diagram stage with monthly shipments of MP. Focusing on design activity, definition cameras, according to customers' applications and our supplier roadmaps

- Defining with customer the relevant sensor, optics, holder, mechanics of his application.

- Supporting cameras peripherals ICs: encoders, IMU, accelerometers, ISP and displays.
INET Electronics & Trade LTD.
Complete System Hardware & Software Solution

INET Solutions

ISP Implement

Sensors

Modules

Board Level Camera

LWIR & MWIR Sensors and Cameras

RF Cables

VIS Optics

MV Solutions

Block/Zoom Cameras

LWIR & MWIR & SWIR Lenses and Optics
INET APPLICATIONS

Mobile phones  Security and Surveillance  Automotive

3D & AR-VR  Medical  Others
INET Electronics & Trade LTD.
Complete System Hardware & Software Solution

INET Suppliers

Asia Optical
Alhwa Technology
CIS
FoxLink
Gpixel
Vision Components

Sunny
OmniVision
Truly
Conexant
Fujikura
Bosch
SunplusIT
Shalom EO
Dream CHIP

Camera Module Market Growth

2015 MARKET ($9.9B)

- Mobile Phones: 70%
- Digital Cameras: 7%
- Security: 2%
- PC & Tablets: 7%
- Optical Mice: 2%
- Toys & Video Games: 1%
- Automotive: 3%
- Medical & Scientific: 2%
- Industrial: 4%
- Others: 2%

2022 MARKET ($17.2B, Fcst)

- Mobile Phones: 48%
- Automotive: 14%
- Others: 6%
- Medical & Scientific: 6%
- Industrial: 6%
- Toys & Video Games: 2%
- Optical Mice: 2%
- PC & Tablets: 6%
- Security: 6%
- Digital Cameras: 4%
- Others: 2%

INET Electronics & Trade LTD.
Complete System Hardware & Software Solution
INET Customers

INET Electronics & Trade LTD.
Complete System Hardware & Software Solution
Omnivision

Technology Leader

Founded in 1995
Omnivision Technologies, Inc. develops and delivers advanced imaging solutions to a variety of industrial and consumer markets:

Automotive, Medical Imaging, Mobile Devices, Surveillance, AR, VR, Drones, Robotics, Notebooks & Entertainment.

Omnivision's core strengths are its proprietary image sensing, state-of-the-art CMOS processing, and packaging technologies. Through superior pixel design, semiconductor manufacturing processes and package development, Omnivision sensors enable customers to capture images at higher resolutions, lower light levels, with better image quality, and in less space than ever before.
Omnivision CameraCubeChip

A Simplified Supply-Chain Solution

Omnivision has created a simplified, one-stop shop for wafer-level camera modules that require minimal assembly and handling. The reflowable CameraCubeChip™ can be directly soldered to the printed circuit board with no socket or insertion required, making integration simple.

Small-Form-Factor Camera Solution

With the CameraCubeChip™, Omnivision delivers fully integrated CMOS-based chip products with high-quality camera functionality in very small footprints and low profiles to deliver miniature camera modules that fit in tiny spaces, allowing for multiple cameras in one device.
OmniVision's LCOS technology enables a turnkey solution with image sensor and LCOS display technologies.

OmniVision's LCOS technology targets AR and VR, smart shelves, pico projectors, automotive and medical applications.

**Full digital single chip LCOS panel**
Integrated driver function and frame buffers in a single chip LCOS panel simplifies the system design and makes the system compact with the small form factor.

**Low power consumption**
All in one LCOS successfully reduces the power consumption by 40% compared to the 2 chip solution. It is ideal for wearable devices, such as AR and VR products.

**High resolution and high frame rate**
OmniVision's LCOS products feature high resolution, high frame rate, and up to 6 color fields to deliver crisp clear stable images without image retention.
Synaptics

Synaptics ignited the human interface revolution. Our touch, display and biometrics products are built on the company’s storied research and development, extensive intellectual property and global partnerships. With solutions designed to optimize the user experiences in the mobile, PC and automotive industries, Synaptics combines ease of use, functionality and aesthetics to enable products that help make users' digital lives more productive, secure and enjoyable.

Synaptics has shipped more than 6-billion units and has reached a runway of a billion a year.

Synaptics has more than 2000 patents that are either pending or issued.

70% of Synaptics employees work in technology, engineering and product-design functions.
Voice has become the most exciting interface for interacting with consumer electronics. AudioSmart SoCs enable advancements in the smart home by incorporating home-grown far-field voice and wake word technologies as well as supporting the Synaptics SyNAP™ AI framework. Throughout the voice revolution, Synaptics has been bolstering its industry-leading portfolio of advanced audio hardware and software solutions designed to help today’s always-listening voice-enabled devices hear and be heard.
CIS

Welcome new technological challenges

CIS Corporation is a manufacturer of industrial cameras. We develop, design, manufacture, and market high quality industrial camera systems and board cameras for machine vision and security camera applications. We began manufacturing industrial cameras under our own brand in 1991, and have consistently pursued “high-density packaging”, “high speed”, and “high performance” ever since.

We are developing cameras featuring unique high-speed, high-resolution and CMOS image sensors equipped with faster interfaces ranging from CoaXPress to optical I/F. We also have dedicated teams for the design and development of signal processing using both FPGA and Texas Instruments’ digital media processors.

As for our image process technology “Clarivu™”, we provide licenses of our IP for incorporation into our customers’ products. The number of licensees is on a steady rise, and we will carry on promoting our technology for use in such areas as medical, broadcasting and food inspection applications which are all new business terrains to CIS.
CIS - ISP Solution

**ISP Algorithm**

Proprietary ISP (Image Signal Processor) engine for crisp, low pseudo-color, and low artifact, color image processing.

- **High Quality Image**
  Crisp, low pseudo-color, and low artifact color interpolation process produces high quality images equivalent to that of non-real time PC-based DPE application software.

- **CC Precise Color Correction**
  Enables precise color reproduction by way of sophisticated color compensation technology (multiple-axis division of the color plain).

- **High Speed yet Cost Effective**
  Algorithm engine that processes 1920x1080 progressive image signals at 60fps can be implemented into a relatively small, a medium sized FPGA.

- **CI Color Interpolation**
  Color interpolation process produces color images out of signal output from Bayer array color sensor, and significantly affects its image quality. "Clairvu™" enables high resolution, low pseudo-color, and low noise at the same time.

- **(AE) Auto Exposure**
  According to the detected luminance conditions, diaphragm (lens iris), gain level, and shutter speed are controlled to keep the brightness of the image constant.

- **(AF) Auto Focus**
  Contrast detection method that defines the focus position for the maximum contrast as the full focus. Eliminating signal noises as much as possible, auto focus function is effective even for difficult scenes, such as the one under low illumination, telescopic zooming, and others.

- **(AWB) Auto White Balance**
  Human eyes are color flexible and sense the original colors even when the ambient light source changes. To acquire natural images, cameras need to have a similar function to human eyes, in other words, the function to correct the color depending on illuminating conditions. This is a so-called "White Balance" function. In addition to the conventional AWB to make the average color of the image be close to gray, CIS developed auto white balance algorithm to control its balance more precisely, estimating the color of the lighting source.
CIS – Pixel Shift

Pixel Shift Technology Camera

**CMOS**
- Max 400M pixels
- Ultra-high resolution

**Interface**
- CoaXpress

<table>
<thead>
<tr>
<th>Model name</th>
<th>Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>VCC-2SCXP1MPS</td>
<td>VCC-2SCXP1RPS</td>
</tr>
</tbody>
</table>

**Sensor**
- PYTHON25K

**Sensor size**
- APS-H CMOS

**Uncoated pixel (μm)**
- 4.5 μm × 4.5 μm

**Effective pixel (H) x (V)**
- 5120 × 5120

**Resolution (H/W)**
- 25M-100M-400M

**Frame rate (H/W)**
- 81fps-10fps-2.56fps

**Pixel clock**
- 72MHz

**Shutter**
- 1/30 〜 1/30,000s

**Lens mount**
- M48 mount

**Dimensions (WxHxD, mm)**
- 65 × 65 × 77

**Features**
- Global shutter, DIN connector
- B/W: 20480 × 20480
- Color: 5120 × 5120 × 10240 × 10240 (Equivalent to 3CMOS True color)
- Build-in Piezo actuator drive unit

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**Precise image sensor positioning**

In the case of VCC-2SCXP1MPS, an ultrahigh-definition image of 400M pixels is generated using 25M pixel CMOS. This is done by shifting X and Y axes between the sensor’s pixel pitch 4 times in each direction (4x4 of 4.5 μm), capturing images at each position, and synthesizing them to create a single image.

Displacement accuracy of the pixel shift is less than 20.2 μm. The time required for the CMOS to move to the predefined position is less than 10ms.

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**Shoot a chart by VCC-2SCXP1MPS**

![Chart Image]

**Shoot a LCD of smartphone by VCC-2SCXP1RPS**

![Smartphone Image]

**Synthesized Image**

![Synthesized Image]
High-Performance Cable Assemblies You Can Rely On

High Speed Interconnects (HSI) is a leading American company which extrudes and assembles high-performance coaxial cable, exceeding today’s signal integrity requirements. HSI’s low-loss, low-capacitance, phase-stable, coaxial interconnect solutions are available in a variety of cable constructions, which include circular and micro coaxial connector terminations down to 0.3 mm pitch; and fine wire, direct-to-board terminations down to 0.175 mm.
Vision Components

Embedded Solutions
VC mission is offering the customers the best solution possible. This principle is basic to all our developments and enables us to guarantee optimal performance with our SMART CAMERAS.

During the recent years, VC EMBEDDED VISION PORTFOLIO has been growing enormously along with our customers' demands. VC STANDARD MODELS are designed for a broad range of inspection tasks and find their use in many application areas around the world. Of course, being a reliable OEM partner, we also offer INDIVIDUAL SOLUTIONS for specific applications.
Vision Components - MIPI Camera Modules

MIPI CSI-2 Camera Modules for Embedded Vision

The VC MIPI camera boards support the MIPI® CSI-2 (Camera Serial Interface) specification and they are available with many different image sensors, e.g. from z.B. from Omnivision® and from the series Sony Pregius® and Sony Starvis®. The miniature cameras are COMPATIBLE WITH MANY CPU BOARDS. With our VC ADAP96 BOARD, a CSI & Ethernet Adaptor Board, we offer the perfect solution to make an intelligent VC camera from a 96board!

MIPI CSI-2 camera modules are ideal for multi camera applications including mobile and distributed applications like autonomous driving, UAVs, Smart City, medical technology, and laboratory automation.

With MIPI sensor boards we offer OEMs a highly versatile component for their embedded vision solutions – and it’s all made in Germany!
Vision Components - MIPI Camera Modules

<table>
<thead>
<tr>
<th>Module ID</th>
<th>CMOS Sensor</th>
<th>Resolution MP</th>
<th>Color</th>
<th>Shutter</th>
<th>Trigger/FlashOut</th>
<th>fps</th>
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Compatible CPU Boards

<table>
<thead>
<tr>
<th>CPU Board</th>
<th>Processor Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asus®</td>
<td>Tinker Board Processor: Rockchip® RK3288</td>
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<tr>
<td>DragonBoard™</td>
<td>DragonBoard™ 410C Processor: Snapdragon™ 410E</td>
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<tr>
<td>HiKey™</td>
<td>HiKey960 Processor: Kirin™ 960</td>
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<tr>
<td>MediaTec MediaTec X20 Processor: Helio X20</td>
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<tr>
<td>NVIDIA®</td>
<td>NVIDIA® Jetson™ TX2 module Processor: NVIDIA® TX2</td>
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<tr>
<td>Rockchip®</td>
<td>Rockchip® RK3399</td>
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<tr>
<td>Ultra96™</td>
<td>Ultra96™ Processor: Zynq UltraScale™ ZU3EG</td>
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</tbody>
</table>

Vision Components®
- VC Adap96 CSI & Ethernet Adapter
- VC Compute Module Interface (CMI) Board
- Auvidea
  - Avuidea NVIDIA® Jetson™ J100 Processor: NVIDIA® TX1
  - Avuidea NVIDIA® Jetson™ AGX Xavier™ Carrier
- Geniatech
  - 4 IoT - Geniatech Processor: Snapdragon™ 410E
- HummingBoard™
  - HummingBoard™ Processor: NXP i.MX6
  - HummingBoard™ Pro Processor: NXP i.MX6
- MSC
  - MSC SM2-MB-EP1 (Smart carrierr board)
  - MSC SM2-IMX8 (Smart carrierr board)
- Raspberry Pi®
  - Raspberry Pi® Zero V1.3 Processor: Broadcom®
  - Raspberry Pi® 3B+ Processor: Broadcom®
  - Raspberry Pi® 4B Processor: Broadcom®
  - Raspberry Pi® Compute Module Industrial Processor: Broadcom®
- Trenz Electronic
  - ZynqBerry (RaspberryPi® Form Factor with Xilinx® Z-7007S)
Vision Components – Board Level Camera

Intelligent Board Level Cameras for OEM Applications

Basis for the ARM-based board cameras of the VCSBC nano Z series is the ZYNQ® module, a Dual Core ARM Cortex™-A9 module with 2 x 866 MHz and integrated FPGA from Xilinx®. As with all VC Smart Cameras, these processors provide the necessary computing capacity to achieve VC standards: Extreme high-speed in real-time.

The ARM/Linux Smart Cameras are ideally suited for use in industry, but, of course, also for other applications.

The operating system VC Linux takes care of hard- and software interaction. And, last but not least, the Z models provide a special feature: On request, the FPGA can be programmed to achieve a considerable speed boost. With that, the image processing can be executed up to twenty times faster than without FPGA support.
Dream-Chip

Accelerates Your Product Innovation

Germany’s largest independent Engineering Service Provider with a cutting-edge focus on the development and design of ASICs, SoCs, FPGAs, Embedded Software and discrete Systems. More than 25 years of experience in the microelectronics industry make us experts in turnkey solutions from specification to production and delivery – including embedded Linux or Android based board support packages (BSP), Linux or Android driver development or porting and high-speed PCB design with all necessary qualifications CE and FCC. Whether they are in the automotive, broadcast, consumer, industrial or medical market – our clients know they can always rely on our expertise and outstanding engineering skills.
Dream-Chip - Atom Camera Series

**Atom one mini Waterproof**

Smallest SDI broadcast waterproofed camera

- FULL HD resolution
- RS 485 control + power on breakout cable
- One 3G-SDI output
- Size : 32mm x 32mm x 51mm
- Weight : 115 g
- Rolling shutter
- Sensor size : 1/2.5”
- Mount : S-Mount
- Wide angle : 85° @3.4mm lens (included)

**ATOM One 4K Mini 16**

Smallest UHD 1” Global shutter / (4K HDR) camera

- 4K resolution
- RS 485 control + power on Hirose connector
- Two 4K-SDI output (one can be downsampled to 3G)
- Genlock
- Size : 36mm x 36mm x 79mm
- Weight : 123 g
- Global shutter
- Sensor size : 1”
- Mount : C-Mount
- Wide angle : 98° @6mm lens
- Microphone (stereo)
Gpixel

CMOS IMAGE SENSORS FOR PROFESSIONAL APPLICATIONS

Gpixel is a turnkey supplier of advanced off-the-shelf, customized and full custom CMOS image sensors, developed by a seasoned, multi-disciplinary team of image sensor experts. From the offices in Changchun, China (headquarters) and Antwerp, Belgium is Gpixel specialized in providing high-end CMOS image sensor solutions for industrial, professional, medical and scientific applications.

Founded in 2012 by experienced CMOS image sensor designers and semiconductor physicists, Gpixel is committed to continuously innovate and work in close cooperation with its customers and business partners to deliver the most state-of-art CMOS image sensor technologies and products to the global market.
**Gmax0505**

**GMAX0505 2.5 UM 26 MP GLOBAL SHUTTER IMAGE SENSOR**

The GMAX0505 is ideal for machine vision applications where both resolution and optical format are critical factors, utilizing a 2.5 µm global shutter pixel to deliver 26 MP resolution in a 1.1” optical format, and a dynamic range of 60 dB at 150 fps. The sensor is pin compatible with the GMAX2505 and GMAX2509.

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
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<tbody>
<tr>
<td>Resolution (H x V pixels)</td>
<td>2600万 x 5120 (H) x 5120 (V)</td>
</tr>
<tr>
<td>Pixel size (µm)</td>
<td>2.5 µm x 2.5 µm</td>
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<tr>
<td>Optical format (mm/inches)</td>
<td>1.1” x 12.8 mm x 12.8 mm – diam 18.1</td>
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<tr>
<td>Frame rate (fps full resolution)</td>
<td>150 fps (10-bit), 42 fps 12-bit</td>
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<tr>
<td>Shutter type</td>
<td>Global</td>
</tr>
<tr>
<td>Chroma</td>
<td>Monochrome, RGB Color</td>
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</table>

**Spectral Response**

![Spectral Response Graph](image)

*Graphs showing the spectral response of GMAX0505 and GMAX0505RF.*
The GMAX32103 utilizes a 3.2 μm pixel to deliver 103 MP resolution and a dynamic range of more than 65 dB at 28 fps in 12 bit mode. With this combination of resolution, dynamic range and speed, the sensor is an ideal solution for flat panel inspection, PCB inspection and aerial mapping.

<table>
<thead>
<tr>
<th>Resolution (H x V pixels)</th>
<th>103 MP – 11,286(H) x 9,200(V)</th>
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<tbody>
<tr>
<td>Pixel size (μm)</td>
<td>3.2 μm x 3.2 μm</td>
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<tr>
<td>Optical format (mm/ inches)</td>
<td>2.9” – 36.1 mm x 29.4 mm – diam 46.6 mm</td>
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<tr>
<td>Frame rate (fps full resolution)</td>
<td>28 fps(12 bit)</td>
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<td>Shutter type</td>
<td>Global</td>
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<tr>
<td>Chroma</td>
<td>Monochrome, RGB Color</td>
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</table>
Asia Optical

Asia Optical always believes in creative design of optical components to bring human beings to the new state of high-tech life. Therefore, Asia Optical keeps expanding its operation and aims to lead technological trend.
ShalomEO

Optical Components For Versatile Applications

Hangzhou Shalom EO is a leading supplier of crystals, optics, OEM components products, a wide range of the products are offered:

- Crystals, optics and components for laser systems and applications;
- IR lenses, windows and optics for thermal imaging cameras and applications;
- Scintillation crystals and components for X-ray, nuclear ray detection;
- SAW crystals and wafers, Sapphire and other crystal and optics products for semiconductor, industrial, medical, scientific and research applications.
Thank you