Mercury Systems is a leading commercial provider of secure sensor and mission processing subsystems. Optimized for customer and mission success, Mercury’s solutions power a wide variety of critical defense and intelligence programs.

**EnsembleSeries™ CIOE-1390**

Rugged COM Express Intel Atom Apollo Lake E3900 series SBC module with BuiltSAFE technology

- Intel Atom® E3900 (Apollo Lake) SoC, COM Express Type 10 Mini module
- DO-254/DO-178C PCB & BIOS/Boot code certification kit
- OpenGL SC2.0 graphics libraries for multiple RTOS (Inc. DO-178C cert. kit)
- Intel VTx virtualization and embedded GPU
- Up to 8GB ECC DDR3L RAM (soldered)
- Onboard eMMC and up to 32GB MLC flash memory

Mercury BuiltSAFE™ technologies bring the highest level of functional and flight safety to COTS processing modules for aerospace and defense applications. Our proven and reusable certification artifacts meet the highest Design Assurance Level (DAL) objectives of DO-178C and DO-254 to save time and cost while decreasing risk in the development of mission computing, avionics, networking and datalink/communications systems.

The EnsembleSeries CIOE-1390 with BuiltSAFE technology has been engineered for safety certification from the top down, with Mercury’s AS9100-C process for Commercial Avionics Certifications to DO-178C/DO-254 systematically applied throughout all phases of development. EnsembleSeries CIOE-1390 modules enable a smooth development and certification process for complex systems, supported by Mercury’s in-house safety engineering team and their deep domain expertise.

Based on the Intel Atom® E3900 (Apollo Lake) SoC, CIOE-1390 COM Express Type 10 Mini modules are available in both dual and quad-core configurations. EnsembleSeries CIOE-1390 modules leverage Intel’s latest graphics advancements and improved computing performance. Coupled with Mercury’s safety-critical BuiltSAFE-GS OpenGL SC2.0 embedded graphics libraries, the CIOE-1390 provides an industry-leading solution for low power, high performance display rendering applications.

**Technical Specifications**

**Processor**
Atom Apollo Lake E3900 family

**Digital display interfaces**
- DP 1.2 (+++) 4096 x 2160, @ 60Hz (max resolution)
- HDMI 1.4 3840 x 2160, @ 60Hz (max resolution)
- DVI-D 3840 x 2160, @ 60Hz (max resolution)

**LVDS**
Single channel LVDS with one pixel per clock and up to 24-bit color. Maximum pixel clock 112 MHz

**Audio**
Intel HD Audio interface as an ordering option

**PCIe**
Four (4) PCIe Gen-2.0 lanes with the PCIe lane configurations options (4 x1), (2 x1 + 1 x2), (2 x2), and (1 x4), for up to four separate external PCI devices

**USB**
Up to four (4) USB 2.0 ports; two (2) USB 3.0 ports as ordering option

**SATA**
Two (2) SATA Gen 3 storage interfaces with transfer rates of up to 6 Gb/s

**Ethernet**
One (1) 10/100/1000 Mbit Ethernet interface
MAC address
Capability to set MAC address

Storage
Onboard eMMC 5.0 MLC NAND flash with 2GB to 32GB options

Board support package
Green Hills INTEGRITY-178 tuMP; Sysgo PikeOS; VxWorks 653, DDC-I Deos
Windows 10 – non certifiable; Linux – non certifiable

Other Interfaces
I2C
One (1) I2C external interface

UART
Up to two (2) serial RX/TX ports (16550A compatible)

Watchdog timer signal
In case of timeout the module provides reset signal to carrier board

GPIO
8 GPIO pins on the COMe connector

Electrical

Power
Supply voltage (VCC)  12 V DC nominal +/- 20%
RTC  2.8 V to 3.47 V

Temperature
Operating temperature  -40°C to +55°C per DO-160G §4.5 Cat A1
Short time operating  -40°C to +70°C per DO-160G §4.5 Cat A1
Ground survival  -55°C to +85°C per DO-160G §4.5 Cat A1/A2
Temperature variation  5°C/min per DO-160G §5 Cat B

Mechanical
COM Express Type 10 Mini
Module dimensions: 84 mm x 55 mm (3.3” x 2.17”) – 5mm connector pitch

Certification evidence:
DO-254 - Design Assurance Guidance for Airborne Electronic Hardware
DO-178C - Software Considerations in Airborne Systems and Equipment Certification

Other Certifications
ROHS6, 2011/65/EU

Product ordering
DO-254/178 Design Certification Evidence Kit - available upon request

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<th>Product Name</th>
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<tr>
<td>CIOE-1395-8E32S</td>
<td>Intel Atom x7 E3950, 8GB DDR3L ECC memory down, 32GB eMMC SLC</td>
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<tr>
<td>CIOE-1395-4E32S</td>
<td>Intel Atom x7 E3950, 4GB DDR3L ECC memory down, 32GB eMMC SLC</td>
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Note: add “C” to the end of part number for conformal coat option