MI/O Extension Total Solution

Build Intelligent Systems Quickly

- MI/O Extension SBC
- MI/O Extension Module
- MI/O Extension Chassis
- MI/O Evaluation Board

ADVANTECH

Enabling an Intelligent Planet

MI/O Extension

Flexible Design Made Easy

MIO.advantech.com

MI/O Extension Single Board Computer

The Flexible SBC with MI/O Extension Modules

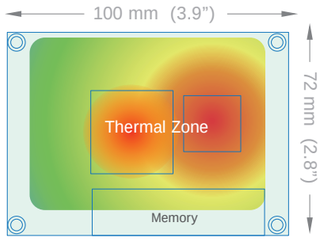
Advantech's innovative MI/O (Multiple I/O) Extension Single Board Computer is strategically positioned between Single Board Computers (SBC) and Computer On Modules (COM). MI/O Extension SBC comes equipped with flexible multiple I/O which helps deliver efficient scheduling, less development resources, and provides system integrators with optimized solutions in a cost-effective way, while still securing their domain know-how in key vertical industrial technologies.

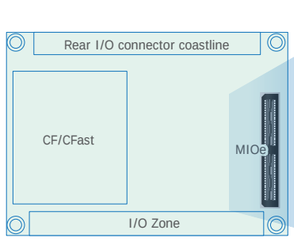
By connecting MI/O Extension modules through high speed sockets, customers can get the most flexible I/O choices to fulfill vertical application requirements. The MI/O Extension connector (MIOe) is ready for additional extended interfaces and future technology trends and currently supports: DisplayPort, PCIe x1*, LPC, SMBus, USB 2.0/USB 3.0, audio line-out and power.

The design of MI/O Extension takes into account future software/hardware/firmware expansion and upgrades. The MI/O Extension module design document is available for reference as well as an evaluation board for MIOe interface verification and testing. These features are all part of Advantech's thoughtful effort to help system integrators flexibly develop market-sensitive solutions to seize those promising business opportunities!

*Up to 4 pairs depending on different platform specifications

MI/O-Ultra



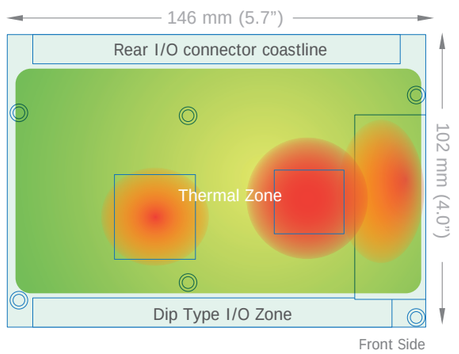


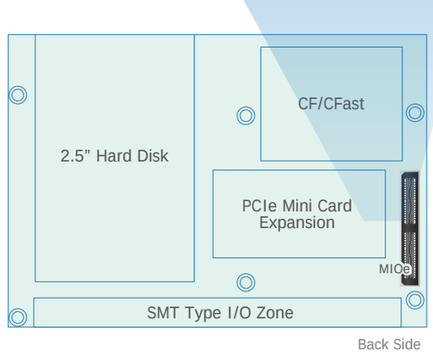
MIOe Pin Assignment

- DisplayPort
- 4 PCIe x1
- USB 3.0
- USB 2.0
- LPC
- HD Audio line out
- SMBus
- +12V/ +5V Power

- Core TDP : Under 8 W
- Ultra low power consumption
- Ultra small form factor (same dimension as 2.5" hard disk or PICO-ITX)
- Competitive pricing with simple I/O

MI/O-Compact

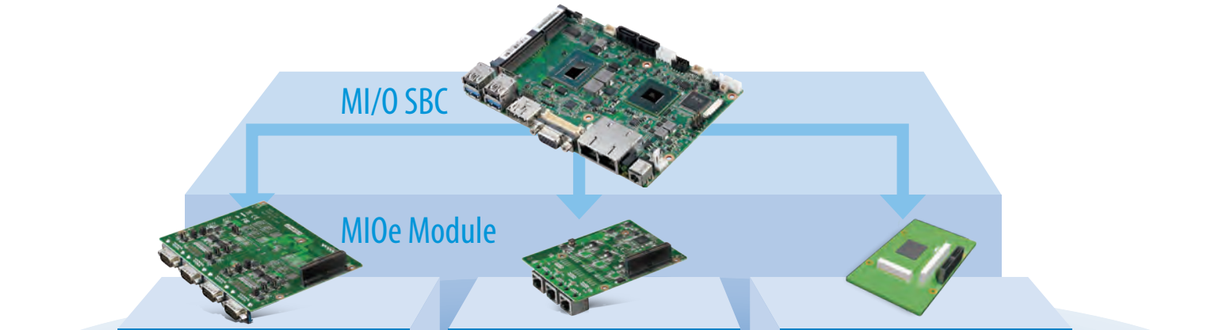




- Core TDP : 9 W – 40 W
- Rich I/O
- Compact size same as 3.5" hard disk
- Supports extended temperature design
- Supports iManager
- Middle to high-end performance platforms

Flexible Service Model - Co-development and Self-development

System Integrators can extend MI/O SBC functionality by implementing MIOe modules with unified MIOe connector. Advantech provides a range of application modules which assists System Integrators in designing their own applications with help from the MI/O extension module design guide on Advantech's website. We also provide a co-development working model with customers. Customers can choose either "Design by Advantech" or "Design by Customer" with Advantech's assistance.



Off-the-Shelf Module

- Immediate availability

Design by Advantech

- Custom specification
- Experienced technical support

Design by Customer

- Custom specification
- Secured domain knowledge

The MI/O Development Process

The co-development working model, called "MIOe Co-development Support," follows Advantech's project development procedures. If customers choose a self-development model, Advantech will assist in process reviews with several checkpoints. Both working models require the following check points:

At the beginning of a project

Advantech assists customers to review block diagrams and evaluate the pros & cons of co-development and self-development models. MI/O Extension specifications, MIOe design guide, evaluation board mechanical drawings and more are available for customers to download.Please visit http://mio.advantech.com

Design by Advantech — Check Points

Step 1: Project Consultancy
- Advantech proposes project concept, block diagram, specifications, schedule and quotation
- Customer approval

Step 2: Schematics Design
- Advantech proposes schematics

Step 3: Placement Design
- Advantech proposes 2D/3D drawing
- Customer approval

Step 4: Layout Design
- Advantech proposes layout routing

Step 5: Production
- Advantech implements sample assembly

Step 6: Verification
- Customer and Advantech FAE verify the product

Design by Customer — Check Points

Step 1: Schematics Review
- Advantech assists customer to review schematics to ensure it meets MIOe design guide

Step 2: Placement Review
- Advantech provides MIOe height limitation and 3D STEP file for customer reference

Step 3: Layout Review
- Advantech provides PCB stack-up and impedance suggestions

Step 4: Production
- Customer implements sample assembly

Step 5: Verification
- Customer verifies the product along with Advantech's assistance

Note: Advantech preserves the right to charge design NRE depending on service scale.

Key Features

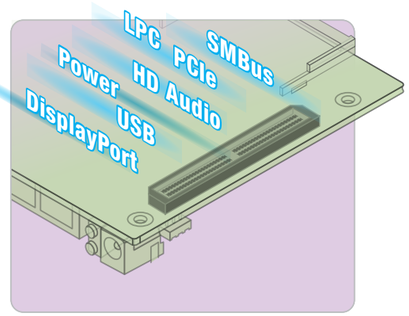
Advantech introduces MI/O Extension to assist system integrators in quickly providing optimal solutions to their clients, while still securing their competitive edge in key vertical industrial technologies.

Why choose MI/O Extension SBC for your embedded development

- Highly integrated design saves up to 20% of system space
- Flexibility for future I/O expansion and upgrades
- Design document and evaluation board support
- Time-saving and cost-effective solution for system integrators

Special Mechanical Design

- Advanced thermal design
- Integrated I/O
- Cableless design



MIOe Unified Connector

MI/O Extension has one unified MIOe connector which supports additional extended interfaces that give more flexible support to bundled I/O modules, either from Advantech or modules designed by the customer. MIOe connector has various height choices from 5mm to 25mm to meet different module requirement.

Interface functions include:

- DisplayPort: HDMI, LVDS, DVI, CRT or eDP display interface
- PCIe x1: GbE, USB 3.0, SATA/RAID, FPGA or PCI expansion
- USB 2.0/ 3.0: super speed storage, capture card, HD webcam & display interface
- LPC: legacy bus & Multi-UART, PS2, GPIO, FDD, IR, Parallel port from super I/O
- HD Audio: Line out, keep flexibility with selected amplifier
- SMBus: GPIO control, smart battery/ charger, W/R EEPROM
- Power: supported by MI/O Extension SBC

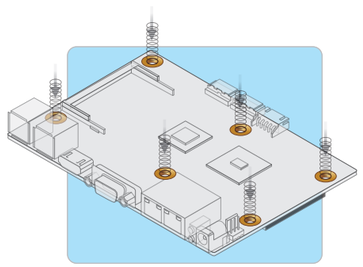
MIOe connector has the following features

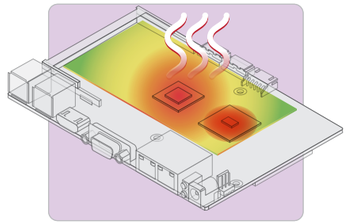
High speed ground plane header	Various height choice	Rich library reference
▪ Multi high speed protocol supported Extended life product ▪ 10 years in Mixed Flowing Gas (MFG)	▪ 5, 8, 11, 16, 19, 25mm height combination for different applications	▪ Electrical/3D model, PCB library/Footprint ▪ Final inch layout reference

Unified System Screw Holes

MI/O Extension provides unified screw mounting holes for easier thermal solution assembly and system integration.

- Easier thermal solution assembly
- Easier system maintenance
- Easier platform upgrades





Concentrated Thermal Design

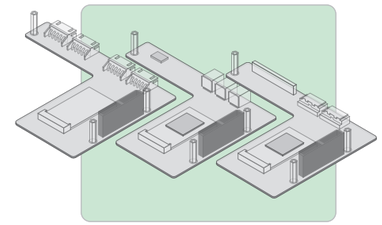
Traditionally, heat flows were routed on the top and bottom sides of embedded boards. Advantech MI/O Extension SBC is designed with a concentrated thermal design so that all heat generation is on the top side only, dispersing heat via the heatsink or the heat spreader with better results.

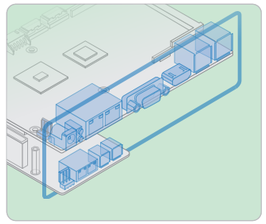
- Covers CPU, the southbridge, memory, power and active IC
- Maximum thermal space
- Heat spreader/heatsink integration
- Simplifes system design
- Thermally sensitive parts on the bottom side to prevent heat problems.

Expansion Module Options

Advantech has developed a series of modules that are ready for future interface designs and made for flexible vertical application demands.

- Display module: 48-bit LVDS/ DisplayPort/ USB2.0
- Communication module: Triple GbE
- Multiple I/O module: Multiple COM Ports
- Evaluation Board: for flexible interface verification
- Your own MIOe module to secure your domain know-how





Reduced Cabling

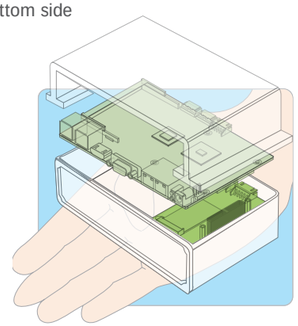
MI/O Extension single board computers come with unified I/O connector coastlines, CompactFlash and PCIe Mini Card locations. An area under the board is also designated for a 2.5" hard disk. The structural uniformity helps eradicate possible problems with integration during future upgrades.

- Less cabling and lockable connectors on the bottom side
- Reduced assembly, complexity, and labor costs

Compact Mechanical Design

Compact mechanical designs and simplified layouts address the major concerns of embedded system integrators.

- Reduced system assembly parts
- Saves up to 20% system space
- Optional heat spreader for lower total height



MI/O Superior Thermal Solution

Advantech MI/O SBC is with a concentrated thermal design. All heat generating components are placed on the top side, dispersing heat via the heatsink or the heat spreader. This concentrated design provides lots of benefits for system integration and enhance reliability.

Utmost Utilization of Heatsink

Heatsink/heat spreader covers CPU, south bridge, memory and most heat generating components.

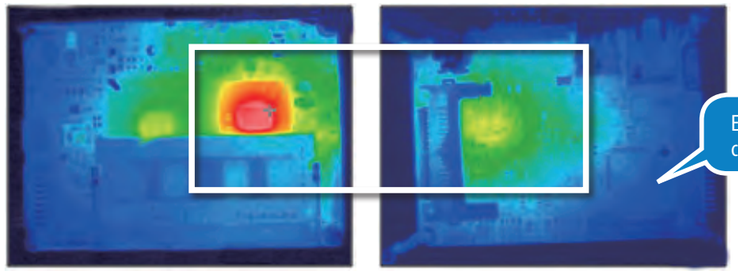
Easier System Integration

System integrators only need to consider the thermal solution for one side with MI/O SBC.

Better Reliability

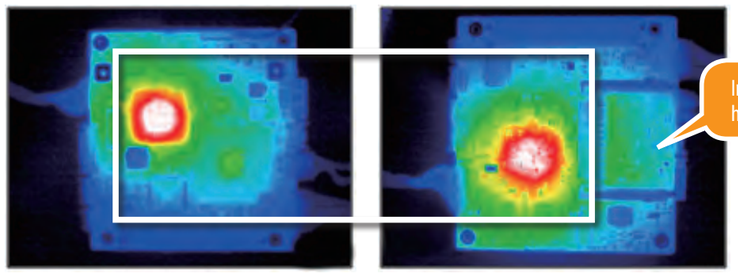
MI/O SBC places thermal sensitive components on the bottom side to prevent heat problems and thus increasing the reliability of components.

MI/O CPU Board with Intel Atom N455



Top View Bottom View

Other CPU Board with Intel Atom N455



Top View Bottom View

MI/O Extension Module – Easy Expansion, Immediate Applications

MI/O Extension Module supports many embedded single board computers, and enables customers to get the most flexible I/O choices to fulfill all kinds of vertical applications.All MIOe modules are compatible with all MI/O SBC thanks to unified MIOe connector and system screw holes.

** Advantech provides a design reference guide for customers to design their own MI/O Extension Module.

MI/O-Compact

MIOe-210

- Multiple COM Ports (4x RS232/422/485, 2x RS422/485)

+ MIO-5250 MIO-5270 MIO-5290 MIO-5271

- Up to 6x RS232/422/485, 4x RS422/485

MIOe-220

- Triple Intel® Gigabit Ethernet

+ MIO-5250 MIO-5270 MIO-5290 MIO-5271

- Up to 5 x Intel Gigabit Ethernet

MIOe-230

- 48-bit LVDS or DisplayPort, 2 x USB 2.0

+ MIO-5250 MIO-5270 MIO-5290 MIO-5271

- Up to 2 x LVDS, 8 x USB 2.0

MI/O-Ultra

MIOe-110

- 2 x RS232, 2 x RS232/422/485, 2 x USB 2.0

+ MIO-2260 MIO-2261

- Up to 4xRS232, 2xS232/422/485, 2 x USB 2.0

MIOe-120

- Dual Intel® Gigabit Ethernet/ Mini-PCIe with SIM holder/ HDMI/ Audio with Amp./ 2 x USB2.0

+ MIO-2260 MIO-2261

- Up to 3 x Intel® Gigabit Ethernet/ 2 Mini-PCIe with SIM holder/ HDMI/ Audio with Amp./ 4 x USB2.0

MI/O Extension Evaluation Board

MIOe-DB5000

- Evaluation board for all MI/O SBCs
- Form factor: Micro ATX (244 x 170 mm)
- Digital Display Interfaces
- 3 PCIe x1
- USB 2.0/ USB 3.0
- HD audio line out
- LPC
- SMBus
- GPIO
- PCIe Mini Card, SIM holder
- SATA, SATA Power

MIOe-DB2000

- Evaluation board for MIO-2262
- 115 x 165 mm
- 1 PCIe x1, 1 mini PCIe
- 6 USB 2.0
- 1 Display Port/ HDMI (HDMI supported by request)
- 1 SIM Card Holder

PRODUCT SELECTION

MI/O Extension Single Board Computers

Model Name		MIO-5250	MIO-5270	MIO-5271
Form Factor		3.5" MI/O-Compact SBC	3.5" MI/O-Compact SBC	3.5" MI/O-Compact SBC
Processor System	CPU	Intel Atom Dual Core N2600 1.6 GHz/D2550 1.86 G Hz	AMD G- Series, T40R 1.0 GHz single core, T40E 1.0 GHz dual core, T56N 1.65 GHz dual core	Intel® Core™ ULT SoC Dual Core i5-4300U 1.8GHz Celeron 2025U 1.6GHz
	Frequency	Dual Core 1.6 GHz/1.86 GHz	1.0 GHz single/dual core, 1.65 GHz dual core	Dual Core 1.8GHz/ 1.6GHz
	L2 Cache	1 MB	512 KB on T40R/ T40E, 1 MB on T56N	3M on 4300U, 2M on 2025U
	System Chipset	Intel Atom N2600/D2550 + Intel NM10	AMD G-Series + A50M FCH	Intel Lynx Point LP
	BIOS	AMI EFI 16Mbit	AMI EFI 32Mbit	AMI UEFI BIOS at 128 Mb
Memory	Technology	DDR3 1066 MHz (D2550), DDR3 800 MHz (N2600)	DDR3 1066 MHz, 1333 MHz for T56N only	DDR3L 1333/1600 MHz
	Max. Capacity	4 GB	4 GB	8 GB
	Socket	1 x 204-pin SODIMM	1 x 204-pin SODIMM	1 x 204-pin SODIMM
Display	Chipset	Intel Atom N2600/D2550	AMD G- Series	Intel® HD Graphics 5000
	Graphic Engine	DirectX 9 and OpenGL3.0 support Hardware decode H/W acceleration: MPEG2 H/W Decode/Acceleration: H.264/ VC1/ WMV9	DirectX® 11 graphics with UVD 3.0 2D Acceleration, 3D Acceleration, Motion Video Acceleration, Supports DVD, Blu-ray* Hardware decode (UVD 3):H.264, VC-1 & MPEG2	DirectX11.1, OpenGL 4.0, and OpenCL 1.3 Full AVC/VC1/MPEG2 HW Decode
	LVDS	18/24-bit LVDS1: up to 1366 x 768 (N2600), 1440 x 900 (D2550) 48-bit LVDS2: up to 2560 x 1600 (only for MIO-5250D-S8A1E)	LVDS: Supports single channel 24-bit or dual channel 48-bit LVDS T56N up to 2560 x 1600 at 60 Hz, T40R, T40E, up 1920 x 1200 at 60 Hz (pixel clock rate = 80 MHz)	LVDS with 3.3V, 5V on LCD VDD power, 5V and 12V support on LVDS inverter Dual channel 24-bit LVDS, max resolution up to 1920 x 1200 with 60Hz
	VGA	Up to 1920 x 1200	T56N up to 2560 x 1600, T40R / T40E, up to 1920 x 1200	Up to 1920 x 1200 with 60 Hz, 154 MHz pixel clock rate
	HDMI/DP	Supports 1920 x 1200, Max data rate: up to 1.65 Gb/s, Supports HDMI v1.3 Up to 1080p support	Supports 1920 x 1080p at 60 Hz, 36 bpp, Supports HDMI v1.3, using TMDS data encoding	Up to 3200 x 2000 at 60 Hz on DisplayPort, 4096 x 2304 at 24 Hz on HDMI
	eDP	Option (supported by request)	Option (supported by request)	Option (supported by request)
	Dual Display	VGA + LVDS1/2 or VGA + HDMI or HDMI + LVDS1/2	VGA + LVDS or VGA + HDMI or HDMI + LVDS	3 independent displays (VGA + DisplayPort/HDMI + LVDS)
Ethernet	Speed	10/100/1000Mbps	10/100/1000Mbps	10/100/1000Mbps
	Controller	GbE1 Intel 82583V GbE2 Intel 82583V	GbE1 Realtek RTL8111E-VB-GR GbE2 Realtek RTL8111E-VB-GR	GbE1 - Intel i218, GbE2 - Intel i210
	Connector	2 x RJ45 on Rear I/O	2 x RJ45 on Rear I/O	2 x RJ45 on Rear I/O
Audio	Chipset	Realtek ALC892, High Definition Audio(HD), Line-in, Line out, Mic-in	Realtek ALC892, High Definition Audio (HD), Line-in, Line out, Mic-in	Realtek ACL888, High Definition Audio (HD), Line-in, Line out, Mic-in
	Amplifier	Can be supported via MIOe	Can be supported via MIOe	Can be supported via MIOe
WatchDog Timer		255 levels timer interval, programmable by software	255 levels timer interval, setup by software	255 levels timer interval, programmable by software
Storage	Compact Flash	-	-	-
	mSATA	Supports either mSATA or full size miniPCIe, selected by BIOS, default support full size miniPCIe	Supports either mSATA or full size miniPCIe, selected by BIOS, default support full size miniPCIe	Supports either mSATA or full size miniPCIe, selected by BIOS, default support full size miniPCIe
	CFast	1	1	-
	SATA	1, up to 3.0 Gb/s (300MB/s)	2, up to 6.0 Gb/s (300MB/s)	2, up to 6.0 Gb/s (600 MB/s)
Rear I/O	Ethernet	2 (10/100/1000Mbps)	2 (10/100/1000Mbps)	2 (10/100/1000Mbps)
	VGA	1	1	1
	HDMI	1	1	1
	USB	4 x USB 2.0	4 x USB 2.0	2 x USB 2.0, 2 x USB 3.0
	LED	Power, HDD	Power, HDD	Power, HDD
	DC Power Jack	1 (Supported only on MIO-5250N-S6A1E)	1 (Supported only on MIO-5270S-S0A1E & MIO-5270D-S0A1E)	Option (supported by request)
Internal I/O	USB	2 x USB 2.0	2 x USB 2.0	1 x USB 2.0
	Serial	2 RS-232, 2 RS-232/422/485 (RS485 support auto flow control) (ESD protection for RS-232: Air gap ±15kV, Contact ±8kV)	3 RS-232, 1 RS-232/422/485 (RS485 support auto flow control) (ESD protection for RS-232: Air gap ±15kV, Contact ±8kV)	2 RS-232, 2 RS232/422/485 (RS485 support auto flow control) (ESD protection for RS-232: Air gap ±15kV, Contact ± 8kV)
	SMBus	1 (shares with I2C)	1 (shares with I2C)	1 (Shares with I2C pin)
	GPIO	8-bit general purpose input/output	8-bit general purpose input/output	8-bit general purpose input/output
	I2C	1 (shares with SMBus)	1 (shares with SMBus)	1 (Shares with SMBus pin)
Expansion	Mini PCIe	1 (full size) with SIM Holder	1 (full size)	1 x Full-size Mini PCIe 1 x Half-size Mini PCIe
	MIOe	SMBus, 3 x USB2.0, LPC, 1 x PCIe, line out, 5 Vsb/12 Vsb power, power on, reset,Displayport (optional)	SMBus, 3 x USB2.0, LPC, 4 x PCIe, line out, 5 Vsb/12 Vsb power, power on, reset,Displayport (optional)	Displayport, SMBus, 3 x USB2.0, LPC, 1 x PCIe x1, line out, 5 Vsb/12 Vsb power, Power On, Reset
Power	Power Type	Single 12V DC power input	Single 12V DC power input	Single 12V DC power input
	Power Supply Voltage	Supports single 12V input, ± 10%	Supports single 12V input, ± 10%	Supports single 12V input, ± 10%
	Total peripheral power supply output	-	-	-
	Power Consumption (Typical)	N2600: 0.606 A @ 12 V (7.27 W), D2550: 0.829 A @ 12 V (9.95 W)	T40R: 0.59 A @ 12 V (7.08W), T40E: 0.53 A @ 12 V (6.36W), T56N: 0.65 A @ 12 V (7.8W)	TBD
	Power Consumption (Max, test in HCT)	N2600: 0.729 A @ 12 V (8.75 W), D2550: 1.029 A @ 12 V (12.35 W)	T40R: 0.8 A @ 12 V (9.6W), T40E: 0.82 A @ 12 V (9.84W), T56N: 1.35 A @ 12 V (16.2W)	TBD
	Power Management	ACPI	ACPI	ACPI
	Battery	Lithium 3 V/ 210 mAH	Lithium 3 V/210 mAH	Lithium 3 V / 210 mAH
Environment	Operational	0 ~ 60° C (32 ~ 140° F) (Operational humidity: 40° C @ 95% RH Non-Condensing)	0 ~ 60° C (32 ~ 140° F) (Operating humidity: 40° C @ 95% RH non-condensing)	0 ~ 60° C (32 ~ 140° F) (Operational humidity: 40° C @ 95% RH Non-Condensing)
	Non-Operational	-40° C ~ 85° C and 60° C @ 95% RH Non-Condensing	-40° C ~ 85° C and 60° C @ 95% RH non-condensing	-40° C ~ 85° C and 60° C @ 95% RH Non-Condensing
Physical Characteristics	Dimensions (L x W)	146 x 102 mm (5.7" x 4")	146 x 102 mm (5.7" x 4")	146 x 102 mm (5.7" x 4"), same as 3.5"
	Weight	0.78 kg (1.72 lb), weight of total package	0.78 kg (1.72 lb), weight of total package	0.78kg (1.72lb), weight of total package
Height with Thermal Solution	Heatsink	306 mm	336 mm	324 mm
	Heat Spreader	273 mm	253 mm	253 mm
	Cooler	-	336 mm	-

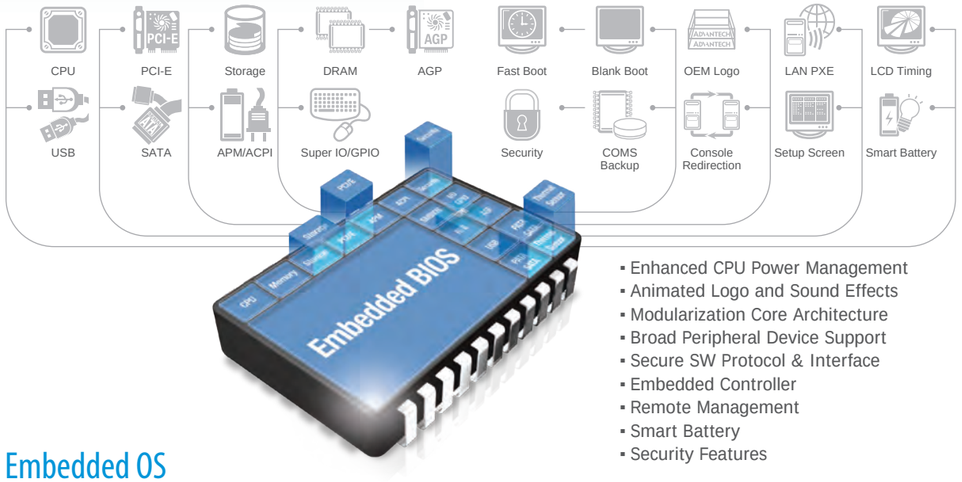
MIO-5290	MIO-2260	MIO-2261	MIO-2262
3.5" MI/O-Compact SBC	2.5" MI/O-Ultra SBC (Pico-ITX)	2.5" MI/O-Ultra SBC (Pico-ITX)	2.5" MI/O-Ultra SBC (Pico-ITX)
Intel ULV Core i3 3217UE/ ULV Core i7 3517UE/ LV Core i7 3555LE	Intel Atom processor N455 Single Core 1.66 GHz	Intel Atom Dual Core N2600 1.6 GHz/ N2800 1.86 GHz	Intel Atom Dual Core N2600 1.6 GHz/ N2800 1.86 GHz
1.6 GHz (Dual Core)/ 1.7 GHz (Dual Core)/ 2.5 GHz (Dual Core)	1.66 GHz	Dual Core 1.6 GHz/ 1.86 GHz	Dual Core 1.6 GHz/ 1.86 GHz
3 MB/ 4 MB/ 4 MB	512 KB	1 MB	1 MB
Intel Core i3/ i7 + Intel QM77 PCH	Intel N455 + ICH8M	Intel Atom N2600/ N2800 + Intel NM10	Intel Atom N2600/ N2800 + Intel NM10
AMI EFI 16 M-bit	AMI 16 M-bit Flash BIOS	AMI EFI 16 M-bit	AMI EFI 16 Mbit
DDR3 (1066/1333/1600) DDR3L (1066/1333) on 2 Core BGA only	DDR3 800 MHz	DDR3 800 MHz (N2600), DDR3 1066 MHz (N2800)	DDR3 800 MHz (N2600), DDR3 1066 MHz (N2800)
8 GB	2 GB	4 GB	4 GB
1 x 204-pin SODIMM	1 x 204-pin SODIMM	1 x 204-pin SODIMM	1 x 204-pin SODIMM
Intel® HD Graphics 4000	Intel Atom processor N455	Intel Atom N2600/ N2800	Intel Atom N2600/ N2800
DirectX 11, OpenGL *3.1, OpenCL* 1.1 JPEG/MJPEG decode, Full encode MPEG2 AVC/H.264 : Main and High Profiles, Up to Level 4.1 (including CABAC)VC-1 : Simple, Main and Advanced Profiles; Up to Level 3MPEG-2 : Main Profile @ ML and HL	Intel Gen 3.5 DX9, MPEG2 Decode in HW Embedded Gen3.5+ GFX Core	DirectX 9 and OpenGL3.0 support H/W Decode/Acceleration: H.264, VC1, MPEG2	DirectX 9 and OpenGL3.0 support H/W Decode/Acceleration: H.264, VC1, MPEG2
48-bit LVDS, up to 2560x1600 at 60 Hz	18-bit LVDS up to WXGA 1366 x 768	18/24-bit LVDS1: up to 1366 x 768	18/24-bit LVDS1: up to 1366 x 768
Up to 2048x1536 at 75 Hz	Up to 1400 x 1050	Up to 1920 x 1200	Up to 1920 x 1200
Up to 1920x1200 at 60 Hz using HDMI Up to 2560x1600 at 60 Hz through DisplayPort	-	-	-
-	-	-	-
3 independent display (VGA + LVDS + HDMI or VGA + LVDS + DP)	VGA+LVDS	VGA+LVDS	VGA+LVDS
10/100/1000Mbps	10/100/1000 Mbps	10/100/1000Mbps	10/100/1000Mbps
GbE 1 : Intel 82579LM GbE 2 : Inte 82583V	GbE1 Intel 82567V	GbE1 Intel 82583V 10/100/1000Mbps	GbE1 Intel 82583V 10/100/1000Mbps
2 x RJ45 on Rear I/O	RJ45	RJ45	64pin connecter A
Realtek ALC892, High Definition Audio (HD), Line-in, Line out, Mic-in	Realtek ALC892 High Definition Audio (HD), Line-in, Line out	Realtek ALC892, High Definition Audio(HD), Line-in, Line out	Realtek ALC892, High Definition Audio (HD), Line-in, Line out
Can be supported via MIOe	Can be supported via MIOe	Can be supported via MIOe	Can be supported via MIOe
255 levels timer interval, setup by software	Output System reset, Programmable counter from 1 ~ 255 minutes/ seconds	Output System reset, Programmable counter from 1 ~ 255 minutes/ seconds	Output System reset, Programmable counter from 1 ~ 255 minutes/seconds
-	Supports CompactFlash Card TYPE II (Primary Master IDE Channel)	-	-
Supports either mSATA or full size miniPCIe, selected by BIOS, default support full size miniPCIe	-	1 (Integrate USB signal, supports either mSATA or USB interface module)	1 (Supports mSATA or USB interface module or full size miniPCIe, selected by BIOS, defaulf is mSATA)
-	-	-	-
2, up to 6.0 Gb/s (600MB/s)	1, up to 3.0 Gb/s (300MB/s)	1, up to 3.0 Gb/s (300MB/s)	-
2 (10/100/1000Mbps)	1 (10/100/1000 Mbps)	1 (10/100/1000 Mbps)	-
1	1	1	-
1	-	-	-
2 x USB 3.0, 2 x USB 2.0	2 x USB 2.0	2 x USB 2.0	-
Power, Hard disk	-	-	-
1 (Supported only on selected SKU)	1 (supported by request)	1 (supported by request)	-
2 x USB 2.0	-	2 x USB 2.0	64pin connecter A (12V DC input, Inverter, VGA, 2 x USB2.0, 1GbE w/ LED) 64pin connector B (SMBus, I2C, Power/Reset button, HDD/Power LED, 2 x USB2.0, 8-bit GPIO, HD Audio Line in/out, 2 x RS-232)
1 RS-232, 1 RS-232/422/485 (RS485 support auto flow control) (ESD protection for RS-232: Air gap ±15kV, Contact ± 8kV)	2 x RS-232(ESD protection for RS-232: Air gap ±15kV, Contact ±8kV)	2 x RS-232(ESD protection for RS-232: Air gap ±15kV, Contact ±8kV)	
1 (shares with I2C)	1 (shares with I2C)	1 (shares with I2C)	
8-bit general purpose input/output	8-bit general purpose input/output	8-bit general purpose input/output	
1 (shares with SMBus)	1 (shares with SMBus)	1 (shares with SMBus)	
1 (full size) + 1 (half size)	1 (half-size Mini PCIe)	1 (half-size Mini PCIe)	1 (Full-size Mini PCIe)
SMBus, USB2.0, USB3.0, LPC, 4 PCIe x 1, line out, 5 Vsb/12 Vsb power, power on, reset, Displayport (by request)	SMBus, 3 x USB 2.0, 4 x PCIex1, LPC, line-out, 5 Vsb/12 Vsb power	2 x USB 2.0, 2 x PCIex1, LPC, line-out, SMBus, DP or HDMI supported by request, 5 Vsb/12 Vsb power	3 x USB 2.0, 2 x PCIe x1, LPC, HD Audio line-out, SMBus, DP or HDMI supported by request, 5 Vsb/12 Vsb Power output
Single 12V DC power input	Single 12V DC power input (Support DC power hot plug)	Single 12V DC power input (Support DC power hot plug)	Single 12V DC power input (Supports DC power hot plug)
Supports single 12V input, ± 10%	Support single 12V input (12V+/- 10%)	Supports single 12V input, ± 10%	Supports single 12V input, ± 10%
-	5V @2.8A for CPU board and MI/O Extension module totally, 12V @2A for MI/O extension module	5V @3A for CPU board and MIOe module totally, 12V @2A for MIOe module	5V @ 3A for CPU board and MIOe module totally, 12V @ 2A for MIOe module
3217UE: w/DDR3L: 1.507 A @ 12 V (18.08 W) 3517UE: w/DDR3L: 1.965 A @ 12 V (23.5 W) 3555LE: w/DDR3L: 2.309 A @ 12 V (27.7 W)	0.64 A, 12 V (7.68 W)	N2600: 0.35A @12V (4.2W) N2800: 0.46 A@ 12 V (5.52 W)	N2600: 0.43 A @ 12 V (5.24 W) N2800: 0.51 A@ 12 V (6.12 W)
3217UE: w/DDR3L: 1.84 A @ 12 V (22.08 W) 3517UE: w/DDR3L: 2.3 A @ 12 V (27.6 W) 3555LE: w/DDR3L: 2.708 A @ 12 V (32.5 W)	0.86 A, 12 V (10.32 W)	N2600: 0.76A @12V (9.12W) N2800: 0.80 A @ 12 V (9.6 W)	N2600: 0.67 A @ 12 V (8.05 W) N2800: 0.82 A @ 12 V (9.8 W)
ACPI	APM, ACPI,wake on LAN	APM, ACPI,wake on LAN	APM, ACPI, wake on LAN
Lithium 3 V/210 mAH	Lithium 3 V/210 mAH	Lithium 3 V / 210 mAH	Lithium 3 V / 210 mAH
0 ~ 60° C (32 ~ 140° F) (Operating humidity: 40° C @ 95% RH non-condensing)	0 ~ 60° C (32 ~ 140° F) (Operating humidity: 40° C @ 95% RH non-condensing)	0 ~ 60° C (32 ~ 140° F) (Operational humidity: 40° C @ 95% RH Non-Condensing)	0 ~ 60° C (32 ~ 140° F) (Operational humidity: 40° C @ 95% RH Non-Condensing)
-40° C ~ 85° C and 60° C @ 95% RH non-condensing	-40° C ~ 85° C and 60° C @ 95% RH non-condensing	-40° C ~ 85° C and 60° C @ 95% RH non-condensing	-40° C ~ 85° C and 60° C @ 95% RH non-condensing
146 x 102 mm (5.7" x 4")	100 x 72 mm (3.94" x 2.83")	100 x 72 mm (3.94" x 2.83")	100 x 72 mm (3.9" x 2.8")
0.85 kg (1.87 lb), weight of total package	0.42 kg (0.93 lb), weight of total package	0.42 kg (0.93 lb), weight of total package	0.37 kg (0. 82 lb),weight of total package
-	337 mm	337 mm	337 mm
273 mm	192 mm	192 mm	192 mm
*583mm (MIO-5290L) 476mm (MIO-5290U)	-	-	-

Embedded Software Services

Advantech provides a full range of services from BIOS, embedded OS, to software API utilities for the MI/O series. System integrators can reduce design effort and project complexity by using Advantech software services for MI/O.

BIOS Modularized Services

Advantech provides modularized Embedded BIOS services that deliver superior performance, compatibility and functionality that system integrators ask for. The many options and extensions enable a wider range of applications that differentiate your solution from the competition.



- Enhanced CPU Power Management
- Animated Logo and Sound Effects
- Modularization Core Architecture
- Broad Peripheral Device Support
- Secure SW Protocol & Interface
- Embedded Controller
- Remote Management
- Smart Battery
- Security Features

Embedded OS

Advantech provides custom Embedded OS images and built-in configuration utilities on our embedded platforms to facilitate system integration.

Windows Embedded OS

In the Embedded market, Windows Embedded OS is very popular due to its easy programming and maintenance features, We have Microsoft Valued Professional (MVP) experts on hand to offer the following:

- Windows XP Embedded Image (WES 2009, WES 7)
- Windows CE Image (CE 4.2, 5.0, 6.0 R3)
- Windows XPe Customization Service
- Board Support Packages (BSP) service
- Build-In utilities for easy configuration of boot logo, EWF protection, FBWF protection etc.

Linux

Linux is growing in popularity in the embedded market, many devices with simple and complex functions will use Linux as their OS. Advantech provides three kinds of Linux.

- General Linux distributions: Ubuntu, Redhat, Fedora & SUSE
- Mini-Linux service: a mini sized version but with full features and graphic UI
- Linux driver modification and configuration
- eSOS service is an emergency OS stored in BIOS ROM which can send e-mail error notifications

Real-time OS

QNX is an ultra-reliable OS for life-critical systems such as air traffic control systems, surgical equipment, and nuclear power plants. Vxworks is another real-time OS used for devices ranging from aerospace and defense, automotive telematics, and small-footprint consumer devices and industrial devices.

- QNX & VxWorks Evaluation Image
- QNX & VxWorks Board Support Package Service
- Professional Service: we offer GPIO, WDT, SMBus, I^2C, HWM and brightness drivers, and software API

Embedded OS support varies by hardware platform.

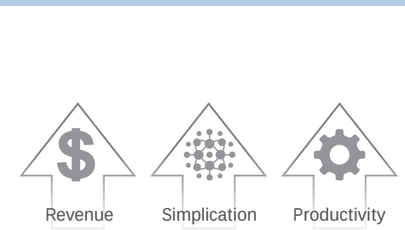
Empowered by SUSIAccess & iManager

SUSIAccess for Remote Device Management

SUSIAccess is a software application preloaded in MI/O SBC to centralize monitoring and managing of embedded devices. By providing a ready-to-use remote access solution, System Integrators can focus more on their own applications, and let SUSIAccess configure their system, monitor devices' health, and recover from system failure.

Benefits of SUSIAccess

- Monitor multiple devices remotely
- Schedule power management
- Protect systems from potential threats
- Access devices using remote desktop
- Lowers complexity for embedded system deployment
- Saves time and resources during development
- Increases system reliability
- Decreases after services cost



Intelligent Self-Management-iManager

All MI/O Compact series support iManager. iManager is an intelligent self-management cross platform tool that monitors system status for problems and reacts to take action if something is abnormal. iManager offers a boot up guarantee in critical low temperature environments so systems can automatically recover when voltages dip. iManager makes the whole system more reliable and more intelligent.

Enhance Reliability

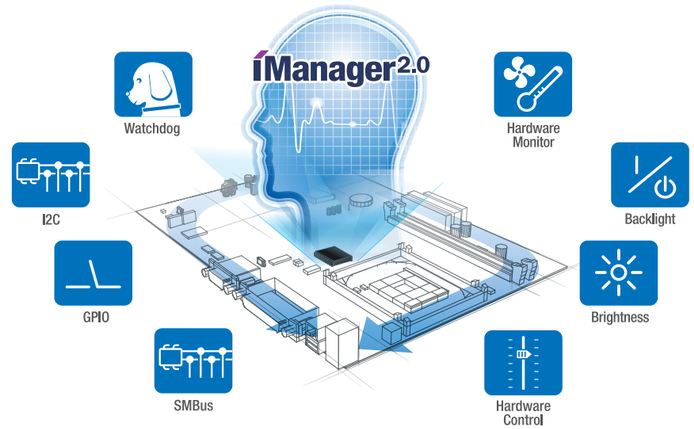
Multi-stage watchdog protection and dynamic thermal & fan control

Simplify Integration

Better performance and easier integrated cross platform API

Secure System

Real-time monitoring & response, and encrypted user EEPROM data storage



*Available in all MI/O-Compact SBC series.

MI/O Extension Chassis

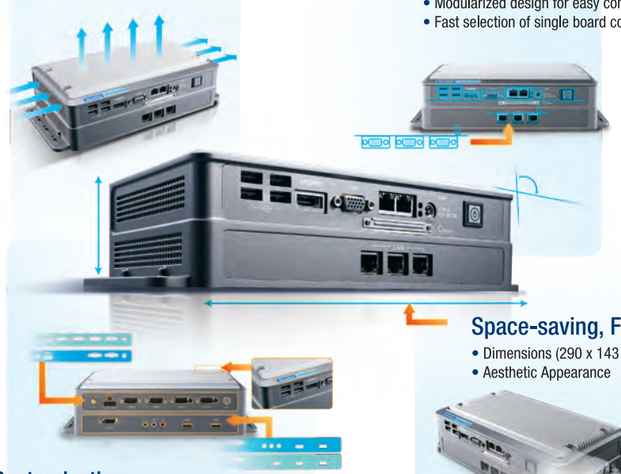
Advantech provides system solutions for MI/O SBC and MIOe modules. The concept is like LEGO bricks. The system integrator chooses a suitable thermal solution, MI/O SBC, MIOe module and assembles them from top to bottom within the MI/O Extension chassis.The chassis has flexible I/O brackets for various modules, making system integration faster, easier and cost saving.

Optimized Thermal Design

- Maximized heat dissipation
- Intel® Atom™ to Core™ i platforms supported

Rich I/O Expansion Possibilities

- Modularized design for easy configuration
- Fast selection of single board computers and I/O modules



Space-saving, Fanless Design

- Dimensions (290 x 143 x 73 mm)
- Aesthetic Appearance

Fast Customization

- Logo
- I/O bracket
- Module

Highly Integrated System

- HDD/SSD/mSATA anti-vibration design
- Accepts commercial grade memory
- Windows/Linux/RTOS supported
- Wireless connectivity

Key Benefits:

More Flexibilities

MI/O chassis is compatible with all MI/O-Compact (3.5") series SBC and different MIOe modules. System integrators can change SBC and modules based on different applications and performance requirements. Due to the unified coastline of MI/O SBC, the I/O bracket for the upper layer is similar. For the bottom I/O bracket layer, it varies with different modules, making the chassis reusable.

More Functions

By changing MI/Oe modules, the whole system can meet any demands. Customers can not only chosoe Advantech's off-the- shelf MI/Oe modules but also design their own MIOe module with minimize time and cost.

Less Development Cost

With MI/O chassis' flexibility, system integrators can easily adopt any function demand by just changing the MI/Oe module. Even development of a new module is easy due to the flexibility of the MI/Oe connector.

Less Development Time

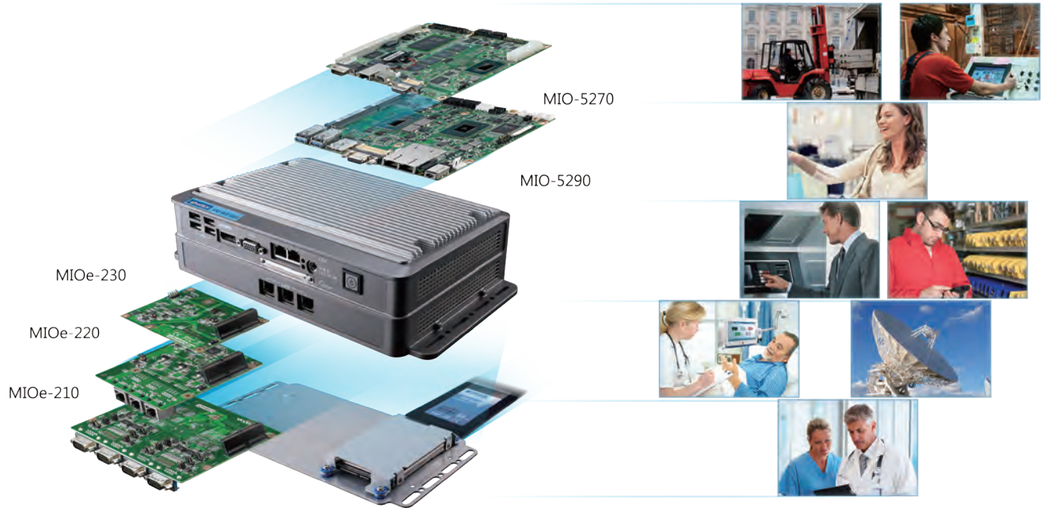
The flexibility of MI/O chassis and MI/Oe connector delivers the shortest development times in the industry. Take development of a new module for example. With MI/O, system integrators can finished their own module design within 3 months on average.

Easy Assembly

Assembling MI/O chassis with MI/O SBC and MIOe module is very easy. We try to simplify the mechanical design so it reduces complexity and time for system integrators.

Design Your MI/O Extension Chassis

Select your MI/O Extension SBC and MIOe modules according to your specific application requirements.



Match with Peripherals

Advantech has a complete product line of peripherals to provide a total solution, such as flash, memory, wireless modules and monitors. All peripherals are industry grade and can work under harsh environments.

SQFlash

- 3 years longevity and warranty
- Industrial quality and service
- Full range product offering

SQRAM

- Wide temperature -40~85°C
- DDR/DDR2/DDR3 SO-DIMM & U-DIMM
- 30u Plating

Wireless

- 7 years longevity
- WiFi/Bluetooth, 3G and GPS module
- Standard temp. 0~60°C and wide temp. -40~85°C

Display

- 5.7"~55" size options
- LVDS, VGA, DVI, HDMI interfaces
- Standard temp. 0~50°C and wide temp. -20~70°C

*Customized brackets and logo silk ink are available depending on customer order volume.

CASE STUDY

Economic Multiple I/O SBC for CNC Device

Introduction

CNC (Computerized Numerical Control) applications are common in the China embedded vertical market for use in laser cutting or milling machines. CNC devices are usually controlled by a Single Board Computer at their core. Because of the rugged working environment requirements, such as dust and vibration, CNC devices traditionally adopted SBCs with PC/104 connectors which supported ISA or PCI interfaces on the mother board, which could then link to other application specific cards.

Application Requirements

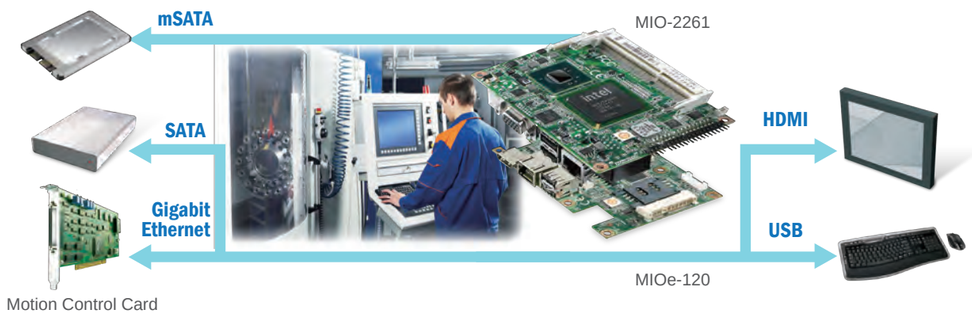
CNC devices prefer stackable designs to guard against dust and especially vibration while working. They also require cost effective modular solutions. This particular customer was seeking an economical ruggedized SBC with multiple I/O that could be easily expanded. Traditional PC/104 and COM boards didn't satisfy the customer because the former had too little I/O support and the latter was over budget.

System Solutions

Advantech's Pico-ITX MIO-2261 board was chosen due to its multiple I/O and ruggedized design. Advantech MIO series is positioned in the market between PC/104 and COM. They hit the right balance between price and flexibility. MIO-2261 not only has multiple I/O, but also has the innovative MIOe connector which consolidates display port, 2 PCIe x1, USB 2.0, LPC, HD audio line out, SMBus, and power. The customer used the MIOe connector on the MIO-2261 board to design their own extension card which with LVDS, 3 x USB ports and SATA.

Benefits

- Cost, and schedule saving for module development.
- Ruggedized design for high-vibration environments.
- Maximum flexibility for expansion through the MIOe connector.



NEW DESIGN

Innovative Form Factor for Metro System

Introduction

As city populations grow, Mass Rapid Transit systems play a crucial role in public transportation strategies in growing metropolitan areas. They can safely and quickly carry millions of passengers every day whilst reducing road traffic and pollution. To ensure that the whole system runs reliably, unforeseen events need to be minimized. Therefore, maintaining a safe and reliable service is the most important challenge.

Application Requirements

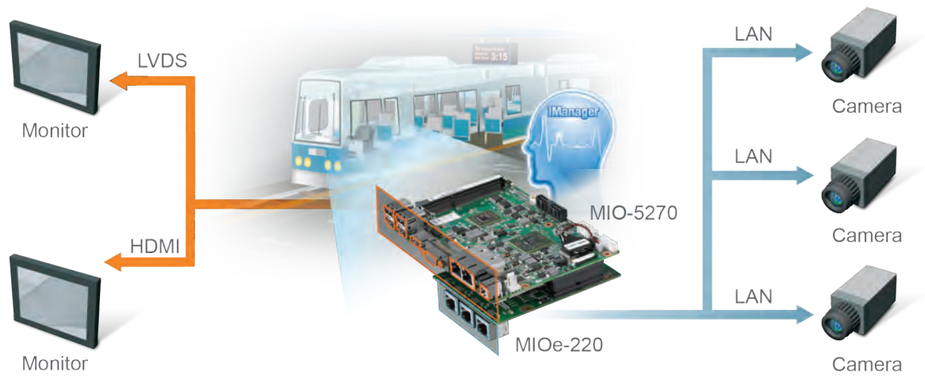
In order to provide a reliable non-stop service, metro systems need to overcome fluctuating temperatures, voltage spikes and other harsh environmental factors. This is especially important for in-vehicle mounted machines inside trains which need to be equipped with intelligent control functions to handle exceptions and critical condition events. If unforeseen events occur, they should be able to self-recover or be remotely recovered and rescued in the shortest time possible.

System Solutions

Advantech's new form factor SBC: MIO-5270 from the MI/O-Compact series, based on the AMD Embedded G-Series platform, comes equipped with an intelligent management tool – iManager, developed by Advantech. This intelligent self-management agent is designed with a Smart Fan utility. With this feature a system's stability can be dramatically increased to better save energy and minimize noise. It's also empowered with a robust hardware monitoring tool whereby information can be utilized as an event trigger or data log, and can be easily integrated into an application or accessed by a remotely controlled program. iManager also supports an advanced Watchdog Timer to correct and reset a system. Lastly, Advantech's MIOe-220 is integrated with MIO-5270 to provide additional extended I/Os to meet application needs.

Benefits

- Compact SBC (146 x 102mm) with maximum flexibility through MIOe extension interface.
- Intelligent management tool – iManager to enhance system reliability.
- Auto-adjusting FAN speed based on temperature.
- Real-time monitoring of system status through local application or remote access.
- Rugged design for wide temperature and vibration challenges.



Embedded Core Services

Integrated Embedded Core Services for Design-in Success

Advantech Embedded Core Services are design-in oriented services. They are streamlined solutions which broadly integrate embedded boards, peripheral modules and software. We believe dedicated focus on Embedded Design-in services can fulfill electronic engineering demands at the design and integration cycle, and minimize uncertainty and risk.

Embedded Software Services
Services include Embedded BIOS services, OS services and software API & utilities to reduce project complexity.

Design-in Services
Design-in services can fulfill electronic engineering demands at the design-in phase and bring benefits which can shorten the design and integration cycle, minimizing uncertainty and risk.

Embedded Boards
A full spectrum of embedded boards in multiple form factors from computer on modules, single board computers, to industrial motherboards.

Embedded Systems
Intelligent systems include fanless embedded box PCs, digital signage players, MI/O Extension Chassis, Industrial Motherboards Chassis,and RISC-based box PCs. All integrated with Advantech software service to enhance system manageability and security.

Peripheral Modules
Industrial peripheral products such as storage, wireless, and touch modules, along with Advantech's software turn-key solutions, provide innovative choices for industrial PC applications.

Regional Service & Customization Centers

China	Taiwan	Netherlands	Poland	USA
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Seoul	82-2-3663-9494
Singapore	
Singapore	65-6442-1000
Malaysia	1800-88-1809
Kuala Lumpur	60-3-7724-3555
Penang	60-4-397-3788
	60-4-397-4188
Indonesia	
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Thailand	
Bangkok	66-2-248-3140
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Melbourne	61-3-9797-0100
Sydney	61-2-9476-9300

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