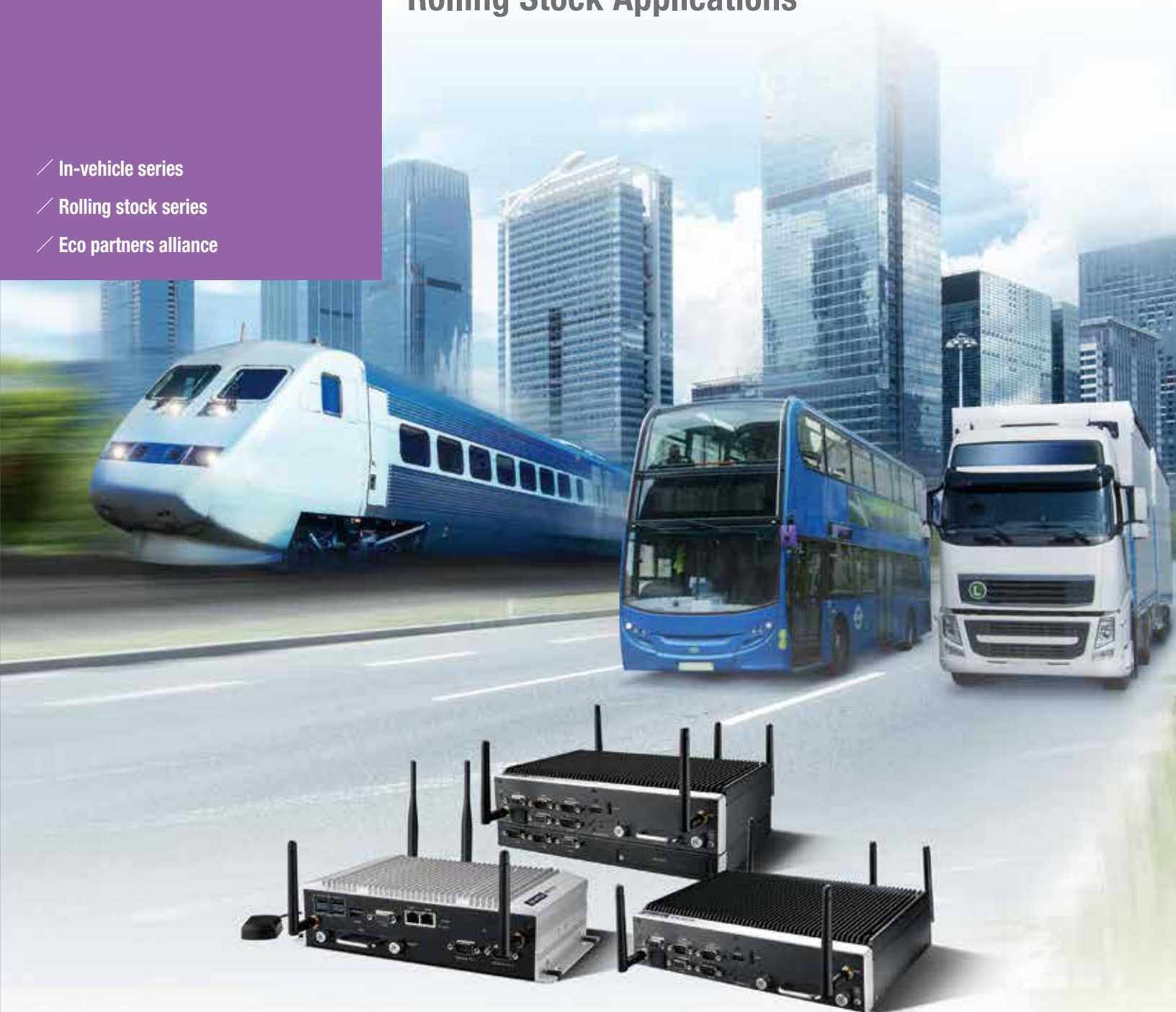


Embedded-IoT

Embedded Systems for Transportation

**Certified Designs for In-Vehicle,
Rolling Stock Applications**

- ✓ In-vehicle series
- ✓ Rolling stock series
- ✓ Eco partners alliance



ADVANTECH

Enabling an Intelligent Planet

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Embedded Systems for Transportation

We provide in-vehicle and rolling stock embedded systems with designs unique for transportation industry applications. These products feature in-vehicle/rolling stock certifications (eMark/EN50155), high extension capability for communication interfaces, wireless 3G/LTE and GPS communication support, and wide operating temperature designs. With flexible and modular hardware design capability, we can efficiently meet customers' function requirements and time-to-market, and enable applications including fleet management, mobile surveillance, passenger information system, traffic surveillance and management, and much more.

Embedded modular design



Stackable extension
 • Communication • Storage extension
 • Data acquisition • ODM

Railway EN50155 Certification

- EN50121-3-2 (EMC)
- EN50121-4 (EMC)
- EN50155 Tx (-40~70°C)
- IEC 61373 (Shock/Vibration)

EMARK In-Vehicle Certification

- ISO 7637-2 (Power)
- IEC 60721-3-5 5M3 (Shock/Vibration)

Embedded peripherals



Vertical accessories



Eco-Partner Collaboration – Key to Success

Advantech collaborates with professional ecosystem partners to provide building blocks required for delivering integrated and innovative solutions to the market. We work closely to ensure compatibility and reliability of our combined solutions, in order to help customers reduce integration efforts, time-to-market, and related costs.

Eco-Partner Program

- Generate additional revenues by being a "solutions seller"
- Grow your market share by leveraging Advantech brand
- Explore new opportunities with Advantech global sales team
- Professional training and support worldwide

Join us at eco-partner@advantech.com





In-vehicle embedded systems

- ✓ In-vehicle standard: EMARK, IEC 60721-3-5
- ✓ Intelligent power ignition management and wide voltage support 9~36Vdc
- ✓ GPS, 3G/ LTE wireless communication functions



On Board Surveillance

Monitor in-vehicle and surrounding status to prevent accidents and enhance passenger safety



Entertainment

Display videos and multimedia in the bus for passengers to be entertained



Passenger Information System

Display messages for passengers to keep updated on station information



Driver Behavior

Detect driver fatigue and abnormal behavior to prevent accidents



Vehicle Diagnostics

Analyze vehicle health data for preventive maintenance



Fleet management

Track vehicle movement for real-time location monitoring

Product offerings



ARK-2121V

- Intel Atom E3845 QC with 4PoE
- Up to 720p 120fps
- -30 ~ 60°C



ARK-2151V

- Intel Core i5-4300U DC with 4PoE
- Up to 1080p 120fps
- -20 ~ 60°C



ARK-2250V

(with Stackable Extension options)

- Intel Core i7-6822EQ QC with 8PoE
- Up to 1080p 240fps
- -20 ~ 70°C



Rolling stock embedded systems

- ✓ Railway standard: EN50155, EN50121-3-2, IEC61373
- ✓ 24Vdc EN50155 S2/C1 compliant, 48/ 72/ 110Vdc options
- ✓ 2nd extensible layer for PoE+, COM/ DIO, storage and add-on modules



Safety Monitoring

Detect abnormal events and forbidden objects to enhance passenger safety



BYOD Infotainment

Enhance passenger experience by providing entertainment content through mobile devices



Traveler Information System

Display real-time train schedules for passengers to keep updated on latest information



Cabin Environment Monitoring

Collect real-time environmental sensor data to detect temperature, smoke, and fire, for safety precautions



Alarm System

Alert passengers about emergency situations to enhance safety

Product offerings



ARK-2231R / 2250R

- Intel® Atom™ / Core™ i platform
- Ruggedized M12 connector design
- -40~70°C EN50155Tx



AMK-R102E

- 4 x isolation COM
- 16 x isolation DIO



AMK-R104E

- 8 x 10/100 PoE+
- 1 x 2.5" drive bay



AMK-R100E

- 8 x GbE PoE+
- 1 x 2.5" drive bay

Stackable Extension Options

Selection Guide



Application	Outdoor	In-Vehicle	Rolling Stock			
Model Name	ARK-2121S	ARK-2151S	ARK-2121V	ARK-2151V	ARK-2231R	ARK-2250R
Processor System						
CPU	Intel Atom E3845	4th Gen Intel® Core i5 4300U	Intel Atom E3825/E3845	4th Gen Intel Celeron 2980U/ Core i5-4300U	Intel Atom E3845/E3950	6th Gen Intel Core i5-6442EQ/i7-6822EQ
Frequency	1.91 GHz	1.9 GHz	1.33 GHz / 1.91 GHz	1.6 GHz / 1.9 GHz	1.91GHz / 2.0GHz	1.9GHz/2.0GHz
Core Number	4	2	2/4	2	4	4
BIOS	AMI EFI 64 Mbit	AMI EFI 128 Mbit	AMI EFI 64 Mbit	AMI EFI 128 Mbit	AMI EFI 64bit	AMI UEFI 128Mbit
Chipset	Intel Atom QC E3845	4th Gen Intel® Core i5 4300U	Intel Atom E3825/E3845	4th Gen Intel Celeron 2980U/ Core i5-4300U	Intel Atom E3845/E3950	QM170
Memory						
Technology	DDR3L 1333 MHz	DDR3L 1600 MHz	DDR3L 1066/1333 MHz	DDR3L 1333/1600 MHz	DDR3L 1333/1867 MHz	DDR4 2133MHz
Max. Capacity	8 GB	8 GB	8 GB	8 GB	8G	32G
Socket	1 x 204-pin SO-DIMM	1 x 204-pin SO-DIMM	1 x 204-pin SODIMM	1 x 204-pin SODIMM	1 x 204-pin SODIMM	2 x 260-pin SODIMM
VGA	1 (up to 1600 x 1200)	1 (up to 1920 x 1200)	1 (up to 1600 x 1200)	1 (up to 1920 x 1200)	1 (up to 2560 x 1600)	1 (up to 1920 x 1200)
Display						
LCD (TTL/LVDS/eDP)	LVDS optional	LVDS optional	LVDS optional	LVDS optional	-	-
DDI (HDMI/DVI/ DisplayPort)	1 x lockable HDMI, up to 1080P	1 x lockable HDMI, up to 4K at 24 Hz	1 x lockable HDMI, up to 1080P	1 x lockable HDMI, up to 4K at 24 Hz	1 x lockable HDMI, up to 3840 x 2160 @ 30Hz	1 x lockable HDMI, up to 4096 x 2160 @ 24Hz
Multiple Display	Dual	Dual	Dual	Dual	Dual	Dual
Expansion Interface						
Mini PCIe	1 x Full-size Mini PCIe 1 x Full-size Mini PCIe 2 x Full-size Mini PCIe w/ SIM holders	1 x Half-size Mini PCIe 1 x Full-size Mini PCIe 2 x Full-size Mini PCIe w/ SIM holders	1 x Full-size Mini PCIe 1 x Full-size Mini PCIe 2 x Full-size Mini PCIe w/ SIM holders	1 x Half-size Mini PCIe 1 x Full-size Mini PCIe 2 x Full-size Mini PCIe w/ SIM holders	1 x Full-size Mini PCIe 1 x Full-size Mini PCIe 1 x Full-size Mini PCIe w/ SIM holder	1 x Full-size Mini PCIe 2 x Full-size Mini PCIe w/ SIM holders
SIM socket	2	2	2	2	1 (accessible)	2 (accessible)
Other						
GPS	-	-	Support GPS, GLONASS, GALILEO and OZSS signals	Support GPS, GLONASS, GALILEO and OZSS signals	Support GPS, GLONASS, GALILEO, BeiDou and QZSS signals	Support GPS, GLONASS, GALILEO, BeiDou and QZSS signals
G-Sensor	-	-	Yes	Yes	Yes	Yes
PoE	4 x 10/100 Mbps PoE	4 x 10/100 Mbps PoE	4 x 10/100 Mbps PoE (E3845)	4 x 10/100 Mbps PoE (4300U)	Optional in 2nd stack: 4/8 x GbE PoE+ (M12 D/X-coded)	Optional in 2nd stack: 4/8 x GbE PoE+ (M12 D/X-coded)
CANBus	-	-	optional	optional	optional	optional
Ethernet						
Controller	GbE 1 : Intel I210-IT GbE 2 : Intel I210-IT	GbE 1 : Intel I218 GbE 2 : Intel I210-IT	GbE 1 : Intel I210-IT GbE 2 : Intel I210-IT	GbE 1 : Intel I218 GbE 2 : Intel I210-IT	GbE 1 : Intel I210-IT GbE 2 : Intel I210-IT	GbE 1 : Intel I210-IT GbE 2 : Intel I210-IT
Audio						
Audio Interface	HD Audio	HD Audio	HD Audio	HD Audio	HD Audio	HD Audio
Connector	3 (Line-in, Line-out, Mic-in)	3 (Line-in, Line-out, Mic-in)	3 (Line-in, Line-out, Mic-in)	3 (Line-in, Line-out, Mic-in)	3 (Line-in, Line-out, Mic-in)	3 (Line-in, Line-out, Mic-in)
3G Voice	-	-	1 x Line-out, 1 x Mic-in	1 x Line-out, 1 x Mic-in	-	-
WatchDog Timer	Yes	Yes	Yes	Yes	Yes	Yes
Storage						
SATA	1 x 2.5" removable drive bay	1 x 2.5" removable drive bay	1 x 2.5" removable drive bay	1 x 2.5" removable drive bay	1 x 2.5" removable drive bay Optional 2nd 2.5" drive bay in 2nd stack	1 x 2.5" removable drive bay Optional 2nd 2.5" drive bay in 2nd stack
mSATA	1 x Full-size mSATA	1 x Full-size mSATA	1 x Full-size mSATA	1 x Full-size mSATA	1 x Full-size mSATA	1 x Full-size mSATA
I/O						
USB 3.0	1	2	1	2	1	2
USB2.0	3	2	3	2	2	1
GPIO	6 x DI & 2 x DO with isolation	6 x DI & 2 x DO with isolation	6 x DI & 2 x DO with isolation	6 x DI & 2 x DO with isolation	1 x 8bit DIO Optional 1 x Isolated 16bit DIO in 2nd Stack	1 x 8bit DIO Optional 1 x Isolated 16bit DIO in 2nd Stack
COM Port	2 x (RS-232/422/485)	2 x (RS-232/422/485)	2 x RS-232/422/485 + 2 x isolated RS-232/422/485 (E3825)	2 x RS-232/422/485 + 2 x isolated RS-232/422/485 (2980U)	2 x RS-232/422/485 Option 2/4 x isolated RS-232/422/485 in 2nd stack	2 x RS-232/422/485 Option 2/4 x isolated RS-232/422/485 in 2nd stack
LAN	2 x RJ45	2 x RJ45	2 x RJ45	2 x RJ45	2 x M12 X-code	2 x M12 X-code
Power						
Power Supply Voltage	9 ~ 36 V _{DC} w/ isolation	9 ~ 36 V _{DC} w/ isolation	9 ~ 36 V _{DC} w/power ignition management	9 ~ 36 V _{DC} w/power ignition management	24 V _{DC} (48 V _{DC} , 72 V _{DC} , 110 V _{DC} optional)	24 V _{DC} (48 V _{DC} , 72 V _{DC} , 110 V _{DC} optional)
Connector	3-pin Phoenix	3-pin Phoenix	3-pin Phoenix	3-pin Phoenix	M12 A-coded	M12 A-coded
Power Adaptor	AC to DC, 19 V _{DC} , 120W	AC to DC, 19 V _{DC} , 120W	AC to DC, 19 V _{DC} , 120W	AC to DC, 19 V _{DC} , 120W	AC to DC, 24Vdc, 150W	AC to DC, 24Vdc, 150W
Regulation	-	-	ISO 7637-2 lev.4	ISO 7637-2 lev.4	EN50155 S2&C1	EN50155 S2&C1
Environment						
Operating Temperature (air flow 0.7 m/sec)	-30~60° C	-20 ~ 60° C	-30~70° C / -30~60° C	-20~60° C	-40~70° C (EN50155 Tx)	-40~70° C (EN50155 Tx)
Vibration Resistance	3 Grms	3 Grms	IEC 60721-3-5 Class 5M3	IEC 60721-3-5 Class 5M3	IEC61373 Category1, Class B	IEC61373 Category1, Class B
Shock Protection	30 G	30 G	IEC 60721-3-5 Class 5M3	IEC 60721-3-5 Class 5M3	IEC61373 Category1, Class B	IEC61373 Category1, Class B
Physical Characteristics						
Dimensions (W x H x D)	264.5 x 69.2 x 133.0 mm	264.5 x 75.1 x 133.0 mm	264.5 x 69.2 x 133.0 mm	264.5 x 75.1 x 133.0 mm	260 x 57 x 160 mm (260 x 83.6 x 160 mm with 2nd stack)	260 x 67 x 160 mm (260 x 93.6 x 160 mm with 2nd stack)
Operating System						
Microsoft Windows	Yes (Win7, 8, 10)	Yes (Win7, 8, 10)	Yes (Win7, 8, 10)	Yes (Win7, 8, 10)	Yes	Yes
Linux	Yes (by Project)	Yes (by Project)	Yes (by Project)	Yes (by Project)	Yes (By project)	Yes (By project)
APIs						
SUSIAccess	Yes	Yes	Yes	Yes	Yes	Yes
Certification						
EMC	CE/FCC Class A, CCC, BSMI	CE/FCC Class A, CCC, BSMI	CE/FCC Class A, CCC, BSMI	CE/FCC Class A, CCC, BSMI	CE/FCC , CCC, BSMI, EN50155	CE/FCC , CCC, BSMI, EN50155
Safety Certifications	CB, UL, CCC, BSMI	CB, UL, CCC, BSMI	UL, CCC, BSMI, CB, E13	UL, CCC, BSMI, CB, E13	UL, CCC, BSMI, CB, EN50155	UL, CCC, BSMI, CB, EN50155

Transportation System Solutions



On Board
Surveillance



Fleet
Management



Passenger
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Onboard
Entertainment



Driver
Behavior



Vehicle
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