

## ITA-5231 Series of Compact Fanless Systems with 6th Generation Intel® Core™ i Processor and EN 50155 Certification for Railway Applications Startup Manual

### Packing List

The ITA-5231 series of compact fanless systems are powered by a 6th generation Intel® Core™ i processor and fully compliant with the EN 50155 standards for railway and industrial applications. These powerful computing platforms can withstand 24/7 operation under harsh conditions.

Before card installation, ensure that the following items have been shipped:

- 1 x ITA-5231 series IPC
- 1 x ITA-5231 accessory box
- 1 x ITA-5231 warranty card

If any of the above items are missing or damaged, contact your distributor or sales representative immediately.

**Note 1:** For the detailed specifications of ITA-5231, refer to the Advantech website at <http://www.advantech.com>.

**Note 2:** Acrobat Reader is required to view any PDF file. Acrobat Reader can be downloaded from <http://get.adobe.com/reader/> (Acrobat is a trademark of Adobe)

For more information about this or other Advantech products, visit the Advantech website at

<http://www.advantech.com>

For technical support and customer service, visit the Advantech support website at

<http://support.advantech.com.tw>

This manual is for the ITA-5231 series.

Part No. 2041523130  
Printed in China

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### Specifications

#### Standard Functions

- **Chip and Chipset:** Intel® Core™ i BGA1023 processor with QM170, CPU frequency 2.5 GHz max.
- **BIOS:** AMI SPI 128 MB flash
- **Memory:** Onboard 8G DDR4 2133 MHz
- **Display:** Intel Integrated Graphics GT2  
Up to 512 MB shared memory, supports Direct x11
- **Display Mode:**
  - DVI: 1920x1200 @ 60 Hz
  - VGA: 1920x1200 @ 60 Hz (optional)
- **Storage:** Maximum support 4 x 2.5" SSD (hot-pluggable, RAID 0, 1, 5, 10), 1 x internal mSATA slot
- **Expansion:** 3 x Mini PCIe slots (2 with SIM slot)

#### System Specifications

- **Ethernet:** 3 x 10/100/1000M Ethernet, M12 X-coded(F), 8 pin
- **USB:**
  - 1 x USB 2.0, M12 A-coded(F), 4 pin
  - 2 x USB 3.0, Type A
- **Display:** 1 x DVI-I connector
- **Serial Port:** 2 x DB9 with RS-232/422/485 automatic flow control
- **Digital I/O:** 4 x DI/4 x DO with 2KV isolation, DB9/Female
- **Audio:** 1 x Audio Out (supports 2-ch 4W 4Ω speaker), 1 x Line In, DB9/Female

#### Mechanical and Environmental

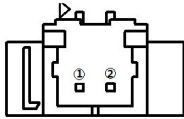
- **Dimensions (W x H x D):**
  - 427 x 195.8 x 88 mm (16.81 x 7.7 x 3.46 in)
  - 482.6 x 221.3 x 88 mm (19 x 8.71 x 3.46 in) with supporting angles
- **Voltage input:** Compliant with EN 50155/EN 50121-3-2  
24Vdc, 7.5A  
48Vdc, 4.5A  
72Vdc, 3.33A  
110Vdc, 2.18A
- **Operating Temperature:** -40 ~70 °C (-40 ~ 158 °F) with wide-temperature SSD, EN50155 Tx level
- **Safe Operating Temperature:** 50 °C (122 °F) max.
- **Storage Temperature:** -40 ~ 85 °C (-40 ~ 185 °F)
- **Weight:** 7.5 kg (16.53 lb)

## Jumpers and Connectors

The ITA-5231 board features a number of jumpers that allow the system to be configured according to specific application requirements. The functions of each jumper and connector are listed in the tables below.

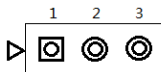
Interfaces (ITB-231R_CPU Board)	
Name	Function
BAT1	RTC battery pin header
JCMOS1	Clear CMOS setting
PMODE1	ATX, AT mode switch
AMPR1	Audio amplifier setting
AMPL1	

BAT1: RTC Battery Pin Header	
Pin	Setting
1	Power (3.3V)
2	GND

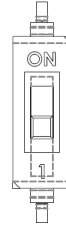


AMPR1/ AMPL1: Audio Amplifier Setting		
Conn	AMPL1	AMPR1
With amplifier (default)	(1-2)	(1-2)
	(4-5)	(4-5)
Without amplifier	(2-3)	(2-3)
	(5-6)	(5-6)

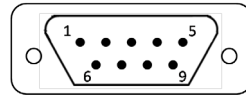
JCMOS1: Clear CMOS Setting	
Pin	Setting
1-2	Default
2-3	Clear CMOS



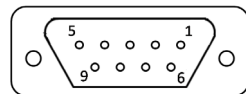
PMODE1: ATX, AT Mode Switch	
Pin	Setting
ON	AT
OFF	ATX (default)



COM: RS232/422/485, DB-9/Male			
Pin	RS232	RS422	RS485
1	DCD	TXD(-)	DATA(-)
2	RXD	TXD(+)	DATA(+)
3	TXD	RXD(+)	/
4	DTR	RXD(-)	/
5	GND	GND	GND
6	DSR	/	/
7	RTS	/	/
8	CTS	/	/
9	RI		



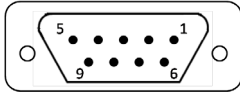
Audio: Mic-In and Audio Out, DB9/Female			
Pin	Signal Name	Pin	Signal Name
1	MICR	6	LOUTR
2	GND_AUD	7	GND_AUD
3	GND_AUD	8	Front_JD
4	MIC_JD	9	LOUTL
5	MICL		



## Jumpers and Connectors (Cont.)

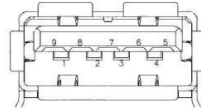
### GPIO: DB9/Male

Pin	Signal Name	Pin	Signal Name
1	GIP1	6	GPO1
2	GIP2	7	GPO2
3	GIP3	8	GPO3
4	GIP4	9	GPO4
5	GND		



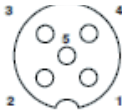
### USB 3.0 Connector

Pin	Signal Name	Pin	Signal Name
1	+V5(VCC)	6	StdA_SSRX+
2	D-	7	GND_DRAIN
3	D+	8	StdA_SSTX-
4	GND	9	StdA_SSTX+
5	StdA_SSRX-		



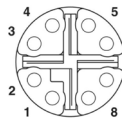
### USB: USB 2.0, M12-A/Female

Pin	Signal Name	Pin	Signal Name
1	+5V	4	NC
2	D-	5	GND
3	D+		



### Ethernet: 10/100/1000Mbps, M12-X/Female

Pin	Signal Name	Pin	Signal Name
1	MDI0+	5	MDI3+
2	MDI0-	6	MDI3-
3	MDI1+	7	MDI2-
4	MDI1-	8	MDI2+



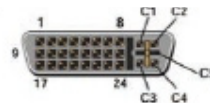
### Power Input: DC-IN, M12-S/Male

Pin	Signal Name	Pin	Signal Name
1	Power	3	GND
2	Power	4	NC



### DVI-I

Pin	Signal Name	Pin	Signal Name
1	T.M.D.S. Data2-	16	Hot Plug Detect
2	T.M.D.S. Data2+	17	T.M.D.S. Data0-
3	T.M.D.S. Data2/4 Shield	18	T.M.D.S. Data0+
4	T.M.D.S. Data4-	19	T.M.D.S. Data0/5 Shield
5	T.M.D.S. Data4+	20	T.M.D.S. Data5-
6	DDC Clock	21	T.M.D.S. Data5+
7	DDC Data	22	T.M.D.S. Clock Shield
8	Analog Vertical Sync	23	T.M.D.S. Clock+
9	T.M.D.S. Data1-	24	T.M.D.S. Clock-
10	T.M.D.S. Data1+	C1	Analog Red
11	T.M.D.S. Data1/3 Shield	C2	Analog Green
12	T.M.D.S. Data3-	C3	Analog Blue
13	T.M.D.S. Data3+	C4	Analog Horizontal Sync
14	+5V Power	C5	Analog Ground (analog R, G & B return)
15	Ground (for +5V, Hsync, and Vsync)		



## Safety Instructions

1. Read these safety instructions carefully.
2. Retain this startup manual for future reference.
3. Disconnect the equipment from all AC outlets before cleaning. Use only a damp cloth for cleaning. Do not use liquid or spray detergents.
4. For pluggable equipment, the power outlet socket must be located near the equipment and easily accessible.
5. Protect the equipment from humidity.
6. Place the equipment on a reliable surface during installation. Dropping or letting it fall may cause damage.
7. Ensure that the voltage of the power source is correct before connecting the equipment to a power outlet.
8. Position the power cord away from high-traffic areas. Do not place anything over the power cord.
9. All cautions and warnings on the equipment should be noted.
10. If the equipment is not used for a long time, disconnect it from the power source to avoid damage from transient overvoltage.
11. Never pour liquid into an opening. This may cause fire or electrical shock.
12. Never open the equipment. For safety reasons, the equipment should be opened only by qualified service personnel.
13. If one of the following occurs, have the equipment checked by service personnel:
  - The power cord or plug is damaged.
  - Liquid has penetrated the equipment.
  - The equipment has been exposed to moisture.
  - The equipment is malfunctioning or does not operate according to the startup manual.
  - The equipment has been dropped and damaged.
  - The equipment shows obvious signs of breakage.
14. Do not leave this equipment in an environment with a storage temperature of below  $-40^{\circ}\text{C}$  ( $-40^{\circ}\text{F}$ ) or above  $85^{\circ}\text{C}$  ( $185^{\circ}\text{F}$ ) as this may cause damage. The equipment should be kept in a controlled environment.
15. **Caution:** The battery is at risk of exploding if incorrectly replaced. Replace only with the same or equivalent type as recommended by the manufacturer. Discard used batteries according to the manufacturer's instructions.

**ATTENTION:** DANGER D'EXPLOSION SI LA BATTERIE EST INEXACTEMENT REMPLACÉE. REMPLACEZ SEULEMENT AVEC LA MÊME CHOSE OU LE TYPE ÉQUIVALENT RECOMMANDÉ PAR LE FABRICANT. JETTES LES BATTERIES UTILISÉES INSTRUCTIONS DE S SELON FABRICANT DES'

16. This equipment has been tested and found to comply with the limits for a Class A digital device. Operation of this equipment in a residential area is likely to cause harmful interference to radio communications, in such cases users are required to correct the interference.
17. This equipment is sold without a power cord. We recommended users purchase a CCC-certified power cord.

In accordance with the IEC 704-1:1982 specifications, the sound pressure level at the operator's position does not exceed 70 dB (A).

**DISCLAIMER:** These instructions are provided in accordance with the IEC 704-1 standard. Advantech disclaims all responsibility for the accuracy of any statements contained herein.

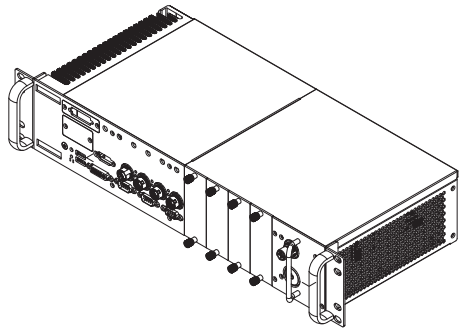
## Safety Precautions - Static Electricity

Follow these simple precautions to protect yourself from harm and the products from damage.

1. To avoid electric shock, always disconnect the power from the PC chassis before manual handling.
2. Disconnect all power before making any configuration changes. A sudden rush of power after connecting a jumper or installing a card may damage sensitive electronic components.
3. Only experienced electronics personnel should open the chassis.
4. Always ground yourself to remove any static electrical charge before touching the motherboard, backplane, or add-on cards. Modern electronic devices are very sensitive to static electric charges. Use a grounding wrist strap at all times.
5. Place all electronic components on a static-dissipative surface or in a static shielded bag.
6. This product is intended to be supplied by a listed DC power source, rated 24V/48V/72V/110V, and TMA 50 °C. If you require further assistance, contact Advantech for additional information.
7. **CAUTION:** Only one module can be extracted at any one time. Additionally, ITAM-I/O modules do not support hot swapping. Turn off the equipment power before extraction. Moreover, do not leave the slot empty after extracting the board. The alternative board or a dummy module must be inserted immediately for safety reasons.

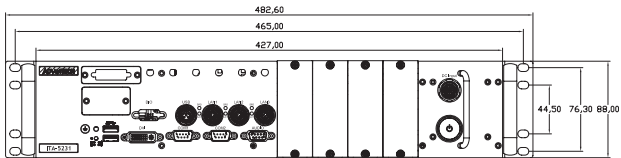
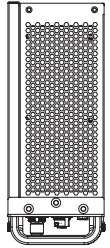
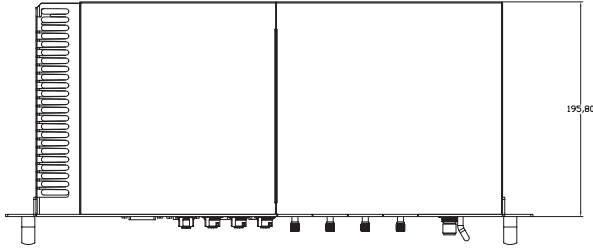
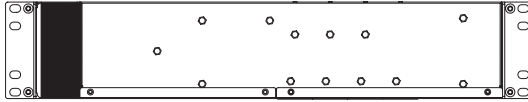
## Installation Notes

When the equipment is powered on, do not place any covering within 30 mm of the heatsink to avoid any restriction to airflow.



When the equipment is installed on a rackmount, ensure that the fin direction is parallel to the direction of airflow. This greatly increases the cooling efficiency.

# System Layout



# Front View

