

ITA-5831 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-5831 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. 1 x ITA-5831 series IPC
2. 1 x ITA-5831 accessory box
3. 1 x ITA-5831 warranty card

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

Note 1: For detailed ITA-5831 specifications, refer to the Advantech website <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-5831 series.

Part No. 2041583111
Printed in China

Edition 2
June 2021

Specifications

Standard Functions

- **Chip and Chipset:** Intel® Core™ i BGA1023 processor with QM170, CPU frequency 2.8 GHz max.
- **BIOS:** AMI SPI 128 MB flash
- **Memory:** Onboard 8 GB/16 GB 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:** Supports 3 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, 8-pin, Female
- **USB:**
 - 1 x USB 2.0, M12 A-coded, 4-pin, Female
 - 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 and 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):**
 - 220 x 88 x 197.2 mm (8.66 x 3.46 x 7.76 in)
 - 256 x 93.5 x 197.2 mm (10.0 x 3.68 x 7.76 in) with mount kit
- **Input Voltage:** Compliant with EN 50155/EN 50121-3-2
 - 24V_{DC}: 4.16A
 - 48V_{DC}: 3.18A
 - 72V_{DC}: 2.12A
 - 110V_{DC}: 1A
- **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:** 4.5 kg (9.92 lb)

Jumpers and Connectors

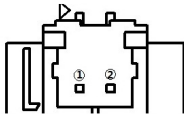
The ITA-5831 board features several jumpers that allow the system to be configured according to specific application requirements. The function of each jumper and connector is listed in the tables below.

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

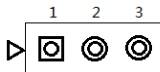


AMPR1/ AMPL1: Audio Amplifier Setting

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

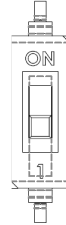
Pin	Setting
1-2	Default
2-3	Clear CMOS



Jumpers and Connectors (Cont.)

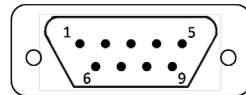
PMODE1: ATX, AT Mode Switch

Pin	Setting
ON	AT
OFF	ATX (default)



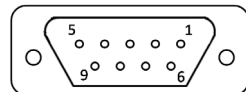
COM: RS232/422/485, DB9/Male

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

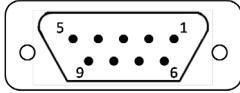
Pin	Signal Name	Pin	Signal Name
1	MICR	6	LOUTR
2	GND_AUD	7	GND_AUD
3	GND_AUD	8	Front_JD
4	MIC_JD	9	LOUTL
5	MICL		



Jumpers and Connectors (Cont.)

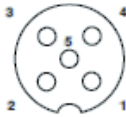
GPIO: DB9/Male

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



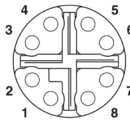
USB: USB 2.0, M12-A/Female

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

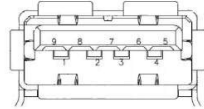
Pin	Signal Name	Pin	Signal Name
1	Power	3	GND
2	Power	4	DC



Jumpers and Connectors (Cont.)

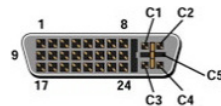
USB 3.0 Connector

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-		



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	Ground	18	T.M.D.S. Data0+
4	VGA DCC Clock	19	Ground
5	VGA DCC Data	20	Ground
6	DDC Clock	21	Ground
7	DDC Data	22	DVI Detect
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	Ground	C2	Analog Green
12	Ground	C3	Analog Blue
13	Ground	C4	Analog Horizontal Sync
14	+5V Power	C5	Ground
15	Ground		



Safety Instructions

1. Read these safety instructions carefully.
2. Retain this startup manual for future reference.
3. Disconnect this equipment from any AC outlet before cleaning. Use 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. The openings on the enclosure are for air convection. Protect the equipment from overheating. Do not cover the openings.
8. Ensure that the voltage of the power source is correct before connecting the equipment to a power outlet.
9. Position the power cord away from high-traffic areas. Do not place anything over the power cord.
10. All cautions and warnings on the equipment should be noted.
11. If not used for a long time, disconnect the equipment from the power source to avoid damage from transient overvoltage.
12. Never pour liquid into an opening. This may cause fire or electrical shock.
13. Never open the equipment. For safety reasons, the equipment should only be opened by qualified service personnel.
14. If one of the following occurs, have the equipment checked by qualified 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.
15. Do not leave this equipment in an environment with a storage temperature of below -40°C (-40°F) or above 85°C (185°F) as this may cause damage. The equipment should be operated in a controlled environment.
16. CAUTION: Batteries are at risk of explosion 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.
17. This equipment has been tested and found to comply with the limits for Class A digital device. Operation of this equipment in a residential area is likely to cause harmful interference to radio communications. In such cases, the user is required to correct the interference.
18. This equipment is sold without a power cord. We recommend purchasing a CCC-certificated power cord.
19. In accordance with the IEC 704-1:1982 specifications, the sound pressure level at the operator's position does not exceed 70 dB (A).

20. Connecting Earth Ground to Equipment

The equipment has a separate protective earthing terminal on the chassis that must be permanently connected to the earth ground to adequately ground the chassis and protect the operator from electrical hazards.

Safety Instructions (Cont.)

21. Caution: Before equipment installation, ensure that qualified service personnel have attached an appropriate grounding lug to the grounding cable supplied. To connect the earth ground to the equipment:
 - (1) Connect one end of the grounding cable to the earth ground.
 - (2) Place the ground lug attached to the ground cable over the protective earthing terminal.
 - (3) Secure the grounding lug to the protective earthing terminal with washers and screws.
 - (4) Dress the grounding cable and ensure that it does not touch or block access to other components.
22. WARNING: Before powering on the equipment, connect the frame of the equipment to the earth ground. For the earthing wire, green and yellow insulation is required and the cross-sectional area of the conductor must be more than 0.75 mm^2 or 18 AWG.
23. WARNING: Regarding the protective earthing terminal with washers and screws, the point where a screw is threaded onto it must not be less than twice the pitch of the screw thread (at least 3.5 mm in diameter). Star and spring washers can be used.
24. WARNING: After powering off and disconnecting the equipment, disconnect the connection between the equipment frame and the earth ground.

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

Consignes de Sécurité

1. Lisez attentivement ces consignes de sécurité.
2. Gardez ce manuel pour référence future.
3. Déconnectez cet équipement de toute prise secteur avant de le nettoyer. Utilisez un chiffon humide. Ne pas utiliser de liquide ou de sprays détergents pour le nettoyage.
4. La prise de courant doit être située près de l'équipement et doit être facilement accessible.
5. Gardez cet équipement à l'abri de l'humidité.
6. La chute de l'équipement pouvant l'endommager, celui-ci doit être installé sur une surface stable.
7. Les ouvertures de l'enceinte sont pour la convection de l'air. Protéger l'équipement contre la surchauffe. Ne pas couvrir les ouvertures.
8. Assurez-vous que la tension de la source d'alimentation est correcte avant de brancher l'appareil à la prise de courant.
9. Placez le cordon d'alimentation de manière à éviter que des personnes marchent dessus.
10. Tous les conseils et avertissements concernant ce matériel et son utilisation doivent être lus et compris.
11. Si l'appareil n'est pas utilisé pendant une longue période, débranchez-le de la source d'alimentation pour éviter les dommages causés par des surtensions transitoires.
12. Ne jamais verser de liquide dans une ouverture. Cela

Consignes de Sécurité (Cont.)

- peut provoquer un incendie ou un choc électrique.
13. Ne jamais ouvrir l'équipement. Pour des raisons de sécurité, l'équipement ne peut être ouvert que par du personnel qualifié.
 14. Si l'une des situations suivantes se présente, faites vérifier le matériel par le personnel de service:
 - Le cordon d'alimentation ou la prise est endommagé.
 - Du liquide a pénétré dans l'appareil.
 - L'équipement a été exposé à l'humidité.
 - L'équipement ne fonctionne pas bien, ou vous ne pouvez pas le faire fonctionner selon le manuel d'utilisation.
 - L'appareil est tombé et est endommagé.
 - L'équipement présente des signes évidents de casse.
 15. Ne pas laisser ce matériel dans un environnement où la température de stockage peut descendre en dessous de -40°C (-40°F) ou être supérieure à 85°C (185°F). Ceci pourrait endommager l'équipement. L'équipement doit être maintenu dans un environnement contrôlé.
 16. ATTENTION: Danger d'explosion si la batterie est inexactement remplacée. Remplacez seulement avec la même chose ou le type équivalent recommandé par le fabricant. Jettent les batteries utilisées instructions de s selon fabricant des.
 17. Cet équipement a été testé et déclaré conforme aux limites imposées aux appareils numériques de classe A. L'utilisation de cet équipement dans une zone résidentielle est susceptible de provoquer des interférences nuisibles. Dans ce cas, l'utilisateur sera tenu de corriger les interférences à ses frais.
 18. Advantech ne fournit pas de composant d'alimentation pour ce produit, les utilisateurs doivent donc en acheter avec un certificat CCC.
 19. Conformément à la norme IEC 704-1:1982, l'opérateur ne doit pas expérimenter un niveau sonore supérieur à 70 dB (A).
 20. **Connexion de l'équipement à la prise de terre**
l'équipement a une protection indépendante de mise à la terre, le châssis doit constamment être relié à la terre afin de protéger l'équipement et l'opérateur des risques électriques.
 21. Attention: avant de commencer l'installation, assurez vous qu'un technicien a installé une cosse adaptée au câble de terre fourni.
Pour relier l'équipement à la terre:
 - (1) Connecter le câble de terre à une prise de terre adaptée.
 - (2) Placer la cosse reliée au câble de terre sûr le boîtier de mise à la terre de la machine.
 - (3) Sécuriser la cosse de terre sur le boîtier de mise à la terre avec des vis et rondelles.
 - (4) Mettre en place le câble de terre en s'assurant qu'elle ne touche pas ou bloque l'accès à d'autres composants.
 22. Attention: Avant la mise sous tension de l'équipement, connecter l'appareil à la terre. Pour le fil de terre, vert et jaune l'isolation est nécessaire et la section de conducteur doit être supérieure à 0.75 mm^2 ou 18 AWG.
 23. Attention: le pas de vis où le boîtier de mise à la terre est vissé ne doit pas être moins de 2 fois le pas de vis, au moins 3.5mm de diamètre, des rondelles étoilées ou belleville peuvent être utilisées.
 24. Attention: la déconnexion de la terre du châssis de l'équipement doit se faire après coupure du courant et déconnexion de l'équipement.

Consignes de Sécurité (Cont.)

AVERTISSEMENT: Ces consignes suivent la norme CEI 704-1. Advantech décline toute responsabilité concernant l'exactitude des déclarations contenues dans ce document.

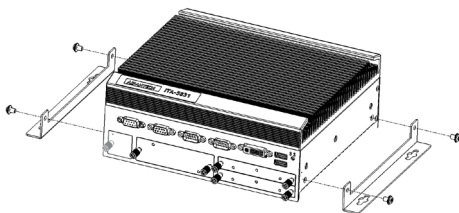
Safety Precautions - Static Electricity

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

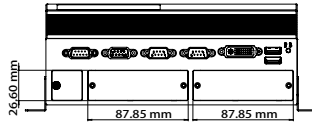
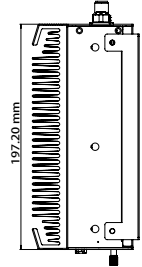
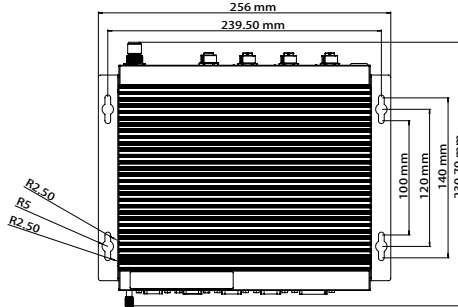
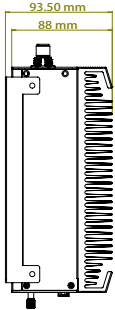
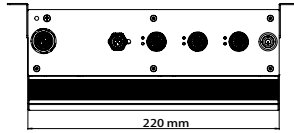
1. To avoid electric shock, always disconnect the power from the PC chassis before manual handling.
2. Disconnect the power before making any configuration changes. A sudden rush of power after connecting a jumper or installing a card may damage sensitive electronic components.
3. Only experienced service personnel should open the chassis.
4. Always ground yourself to remove any static electric 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, 4.16A/3.18 A/2.12A/1A minimum, 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, ITA-EM 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

1. We recommend installing ITA-5831 modules on the plane or wall space of a carriage using mount brackets fixed to both sides.
2. For wall space installations, the fin of the heatsink should be vertical to prevent any restrictions to airflow.
3. For plane space installations, the heatsink should be facing upwards to improve air circulation.
4. Do not place any covering within 30 mm of the heatsink to avoid any restrictions to airflow.



System Layout



Front View

Rear View

