ADM-TJ30

Integrated AI-ADAS ECU and Cameras for Commercial Vehicles

User's Manual



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Leading **EDGE COMPUTING**

Preface

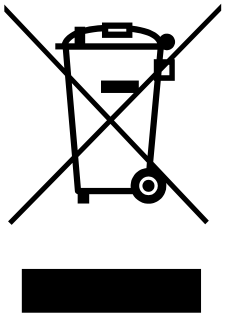
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Revision History

Revision	Release Date	Description of Change(s)
0.1	2024-03-28	Preliminary release
0.2	2024-03-29	Package contents and figures updated

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Conventions



Information to prevent minor physical injury, component damage, data loss, and/or program corruption when trying to complete a task.

Informations destinées à prévenir les blessures corporelles mineures, les dommages aux composants, la perte de données et/ou la corruption de programme lors de l'exécution d'une tâche.



Information to prevent serious physical injury, component damage, data loss, and/or program corruption when trying to complete a specific task.

Informations destinées à prévenir les blessures corporelles graves, les dommages aux composants, la perte de données et/ou la corruption de programme lors de l'exécution d'une tâche spécifique.

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1 Overview

1.1 Introduction

The ADLINK ADM-TJ30 is an automotive ECU — the integrated AI-ADAS ECU — that is connected with 8 cameras designed for effective accident prevention. Powered by vision-AI algorithm, it empowers commercial vehicles to automatically detect and classify vehicles, pedestrians, 2-wheeler riders, etc., and in turn prevent, potential traffic hazards by various ADAS functions. The ADAS functions featured include, and are not limited to, blind spot detection, lane departure warning, forward collision warning, and driver monitoring system.

1.2 Key Features

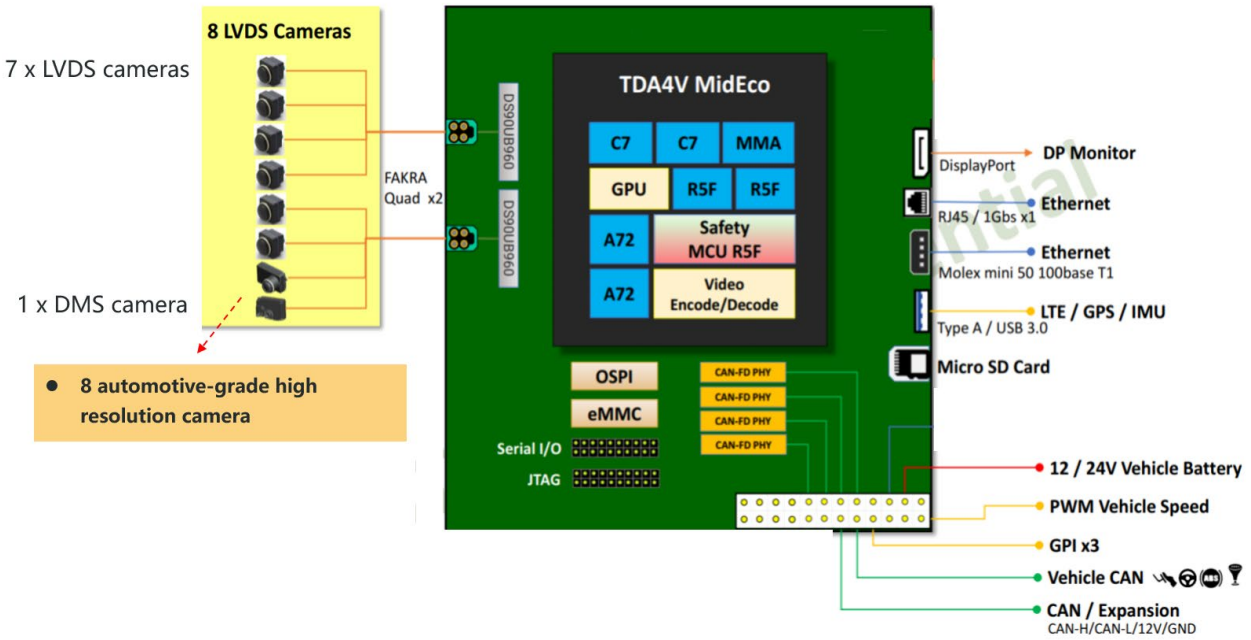
- All-in-one system for 360-degree, in-cabin ADAS solution
  - Automotive-grade ECU & cameras x8
- Multiple ADAS function support:
  - AVM, BSIS/BSD, DMS, LDW, FCW, etc.
- UN-regulation compliance for large commercial vehicle
  - UN R130, R131, R151

1.3 Package Contents

- ADLINK AI-ADAS ECU
- FPD LINK Cameras
- FAKRA cable set

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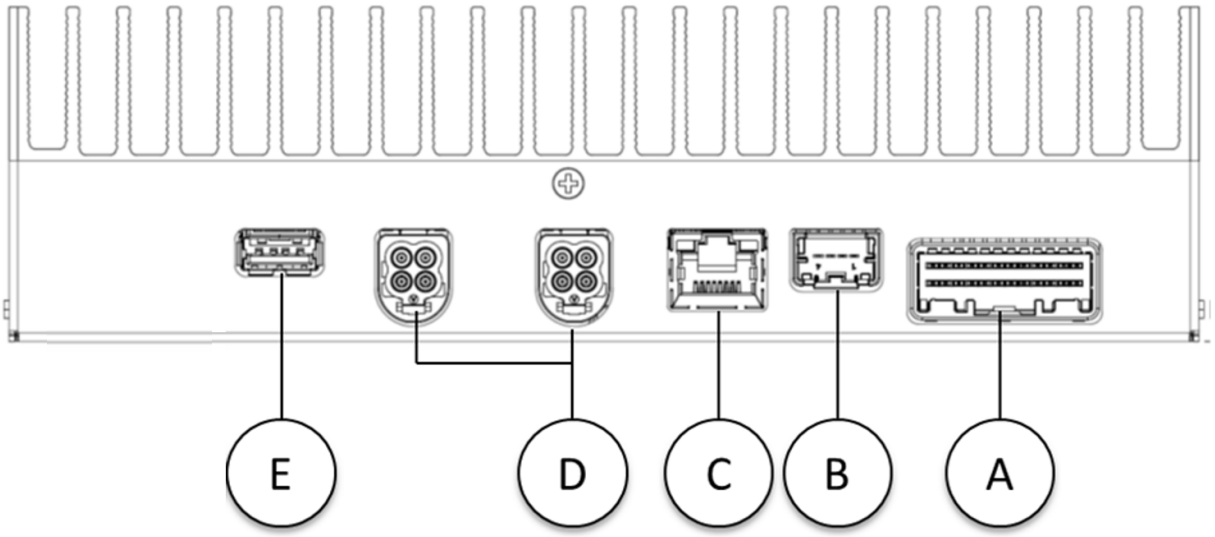
1.4 Block Diagram



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1.5 Mechanical Overview

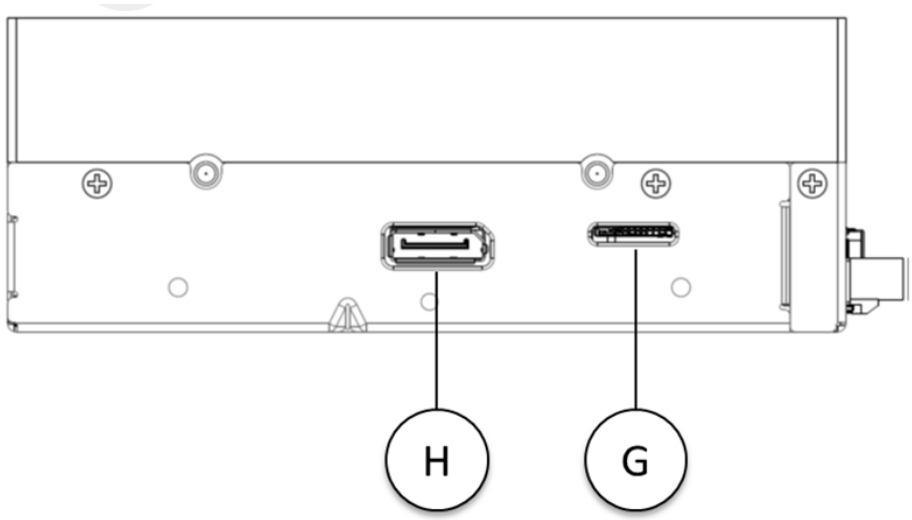
1.5.1 Front Panel



No.	Interface		Description
A	IRISO IMSA-9194B-24B	DC Power In	9-32V
		4x CAN/CAN-FD	
		3x GPI	
		Power output	DC 14V, 1A
B	Molex mini 50	Ethernet 100Base T1	
C	SD-47272-001	RJ45, 1GbE	
D	Mini FAKRA Z	2x Quad-camera inputs	for up to 8 cameras
E	USB Type-A	USB 3.0	

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1.5.2 Side Panel



No.	Interface		Description
G	Micro SD Slot		for recording (optional)
H	SD-47272-001	DisplayPort	

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2 Specifications

ADM-TJ30 Specifications

Operating Voltage		DC 9-32V
Camera De-serializer		TI DS90UB960-Q1 x2
Display		DisplayPort
Optional Display		Serializer TI DS90UB953A-Q1 (customized display board) Serializer MAX96789
Power Consumption		15W (at room temperature, without cameras)
Dimensions		200 x 150 x 56.5 mm (LxWxH)
Weight		TBD
Temperature	**Operating**	-40 to 85°C
	Storage	-40 to 95°C
Reliability		ISO 16750-4 / IEC 60068-2
EMC		ISO 16750-2 / ISO 10605 / VSCC 56-3

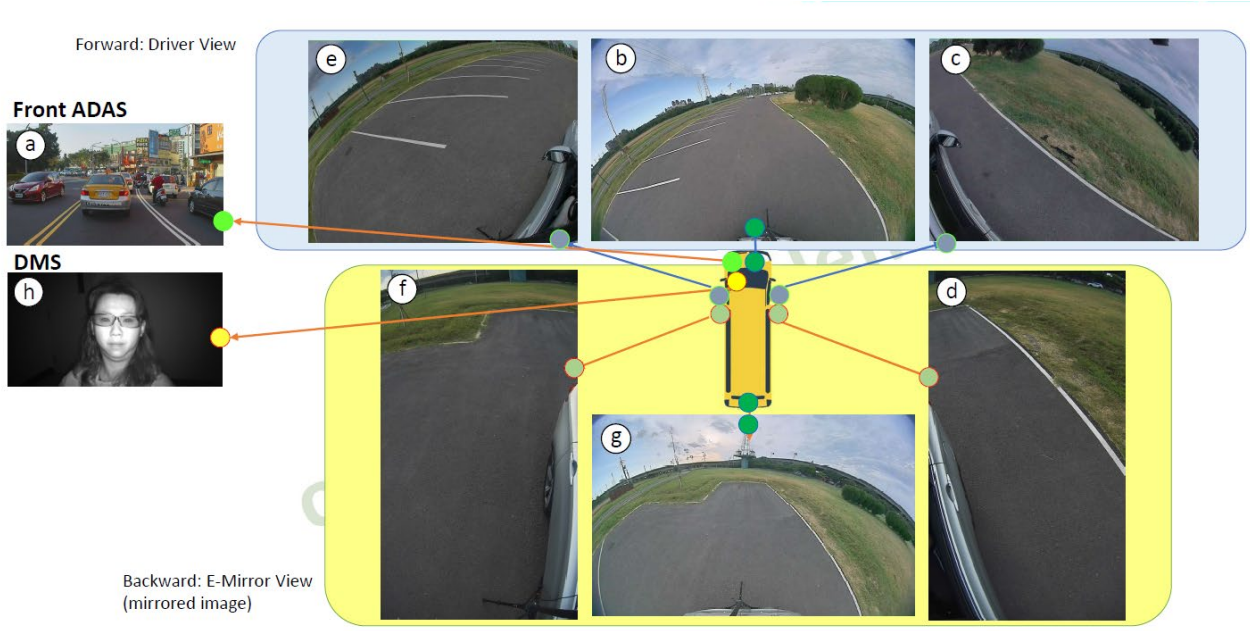
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3 Getting Started

3.1 ADAS Features

The ADLINK ADM-TJ30 provides a comprehensive vision perception solution and development Kit/SDK for ADAS and autonomous driving. This section will describe all achievable ADAS functions for commercial vehicle.

The following figure shows an example of possible camera positions and viewing angles in a bus-driving scenario. Up to 8 camera inputs are supported.



Note: Regarding development Kit/SDK for L1/L2 domain controller, please contact our ADLINK representative for details.

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3.1.1 Forward Collision Warning (FCW)

Vehicle Speed	30km/h to 150 km/h
Detection Target	Automobile motorcycle
Detectable Angle	Front / Rear / Side
Detection Range	Front: ≤100m for automobiles, ≤60m for motorcycles (from the front) Side: ~5.5m (from the center)
Accuracy	Day: ≧95% Night: ≧90%
Alert Trigger	Configurable with a Time to Collision (TTC) between 2.4 and 3.0 seconds
Operating Environment	Day/Night (with sufficient lighting within 50m) Note: If detection targets don't have their light on, the surrounding lighting must be greater than 10 lux.
Number of Detection Targets	Up to 10 automotive, 3 lanes

3.1.2 Lane Departure Warning (LDW)

Vehicle Speed	50km/h to 150 km/h
Detection Range	≤80m (from the front)
Accuracy	≧95%
Alert Triger	Vehicle exceeding lane boundary (before reaching 30cm and without turning signal)

3.1.3 Blind Spot Detection / Information System (BSD / BSIS)

Vehicle Speed	BSD: 35km/h to 150 km/h BSIS: ≤35km/h
Detection Target	Automobile, motorcycle, bicycle, pedstrian
Accuracy	Day: ≧95% Night: ≧90%

BSD Alert Trigger	• Detection target's relative speed ≧ -5km/h
	• Required alerts (ISO 17387)
	  ○ Detection target being within 3m of the vehicle horizontally, or within 15m of the vehicle vertically
	• Recommended threshold alerts (ISO 17387)
	  ○ Detection target being within 6m of the vehicle horizontally, or within 30m of the vehicle vertically

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BSIS Alert Trigger	**Detecting Pedestrians, Bicycles, and Motorcycles:** ● IS: ■ Required alerts (UN R151): ◆ Detection target being within 4m of the vehicle horizontally, within 30m back of the vehicle, or within 7m at the front of the vehicle and with a relative speed nearing the vehicle ■ Recommended threshold alerts (UN R151): ◆ Detection target not meeting required alert but within 5.5m of the vehicle horizontally, within 40m back of the vehicle, or within 12m at the front of the vehicle ● WS: Detection target already meeting required alert as accorded to IS regulations ■ Required alerts (UN R151): ◆ Detection target being within 1m of the vehicle horizontally, within 5m back of the vehicle, or within 1.5m at the front of the vehicle ■ Recommended threshold alerts (UN R151): ◆ Detection target being within 2.5m of the vehicle horizontally, within 7m back of the vehicle, or within 2.5m at the front of the vehicle **Detecting Automobiles:** ● Vehicle speed >10 km/h and detection target exhibiting a relative speed of ≧-5 km/h ● Parameters for required alerts and recommended threshold alerts are the same as those of detecting pedestrians, bicycles, and motorcycles

3.1.4 Driver Monitoring System (DMS)

Camera Installation		• Distance between camera and driver's face shall be 70 to 110cm • Camera focus shall be toward the driver's nose • Camera shall be positioned lower than the driver's nose, and its optical axis and horizontal pitch angle should be between 0 and 15 degrees • The yaw angle between the optical axis of the lens and the human eye (normal driving posture) should be within ±20 degrees. • The pitch+yaw angles of the lens should be greater than 10 degrees.
Driver Recognition		Determining licensed driver, ≧90% accuracy
Fatigue Detection	**Vehicle Speed**	≧30km/h
	Alert Trigger	Driver's eyes closed or yawning (2 seconds)
	Accuracy	≧95%
Vision Tracking	**Vehicle Speed**	≧30km/h
	Alert Trigger	Head turning exceeding the angles for the time set • Raise head: 20 degrees • Duck head: 15 degrees • Turning head left/right: 25 degrees
	Accuracy	≧90%
Smoking	**Vehicle Speed**	≧30km/h

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Detection	**Alert Trigger**	Holding cigarette toward the face (within ~2cm) exceeding the time set (2 seconds)
	Accuracy	≧95%
Phone Usage Detection	**Vehicle Speed**	≧30km/h
	Alert Trigger	Holding phone toward the face (within ~5cm) exceeding the time set (3 seconds)
	Accuracy	≧95%

3.1.5 Around View Monitoring (AVM)

The ADM-TJ30 provides a DisplayPort output for surrounding monitoring display.

Default Video Output	DisplayPort: 1024x768 @30fps (up to 1080p)
AVM Top View	Field of view: 4m radius around the vehicle

3.2 Camera Combinations

Below is a list of camera combinations for the abovementioned ADAS application.

Camera	Functions	Resolution & Frame Rate	Dimensions (LxWxH, mm)
a	**FCW/LDW**	1920x1280 @30fps	28x28x30.7
B	**AVM**	1280x960 @30fps	24x24x28
c	**BSIS / AVM**	1280x960 @30fps	24x24x28
d	**BSD / BSIS / AVM**	1920x1280 @30fps	28x28x32.3
e	**BSIS / AVM**	1280x960 @30fps	24x24x28
f	**BSIS / BSD AVM**	1920x1280 @30fps	28x28x32.3
g	**Rear / AVM**	1280x960 @30fps	24x24x28
h	**DMS**	1280x960 @30fps	44.2x25x22.8

3.2.1 Camera Specs (b/c/e/g)

Image Sensor	CMOS
Pixel Resolution (default	1280x960 (HxV)
Camera Resolution (center/corner)	Center TV line TBD; Corner TV line TBD
Frame Rate (default)	30fps
Color Filter Array	RGGB

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Exposure Control		DOL3
Serializer		TI DS90UB913A-Q1
Output Interface		FPD-Link III with POC
Output Formats		Parallel 8-bit YCbCr data (uyvy)
Power Source (POC)		DC 6-12V
Startup Time upon Powered		≤500ms
Camera Current Consumption		≤120mA @6V
Weight		16.5±5g
Dimensions		24x24x28 mm (FAKRA connector excluded)
Temperature	**Operating**	-40 to 85℃
	Storage	-40 to 95℃
Water/Dust Resistance		IP67

3.2.2 Camera Specs (a)

Image Sensor		CMOS
Pixel Size		3.0x3.0 μm (HxV)
Camera Resolution		2.46M, 1920x1280 (HxV)
Frame Rate (default)		30 fps
Color Filter Array		RGGB
S/N Ratio		51.35 dB
Serializer		TI953
Output Interface		FPD-Link III with POC
Output Formats		MIPI 4-lane YUV422 8-bit
Power Source (POC/ typical)		DC 6-12V / 6V
Startup Time upon Powered		≤200ms
Camera Current Consumption		≤110mA @12V
Weight		28.8g
Dimensions		28x28x31.7 mm (FAKRA connector excluded)
Temperature	**Operating**	-40 to 85℃
	Storage	-40 to 95℃
Water/Dust Resistance		IP67 / IP69K

3.2.3 Camera Specs (d/f)

Image Sensor	CMOS (Sony ISX021)
Camera Resolution	2.46M, 1920x1280 (HxV)
Resolution (center/corner)	TBD

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Frame Rate (default)		30 fps
Color Filter Array		RGGB
S/N Ratio		51.35 dB
Serializer		TI953
Output Interface		FPD-Link III with POC
Output Formats		MIPI 4-lane YUV422 8-bit
Power Source (POC/ typical)		DC 6-12V / 6V
Startup Time upon Powered		≤200ms
Camera Current Consumption		≤110mA @12V
Weight		28.8g
Dimensions		28x28x32 mm (FAKRA connector excluded)
Temperature	**Operating**	-40 to 85℃
	Storage	-40 to 95℃
Water/Dust Resistance		IP67 / IP69K

3.2.4 Camera Specs (h)

Image Sensor		ST VB56G4A
Lens F No.		F2.0
Lens Structure		2G2P with IR940 filter
Camera Resolution		Mega-pixel (1120x1364, default)
Resolution (center/corner)		TBD
Frame Rate (default)		30 fps
View Angle (H)		31 degrees
Color Filter Array		Mono
Exposure Control		External AE
Serializer		TI DS90UB953
Output Interface		FPD-Link III with POC
Output Formats		10-bit raw data
LED		2x IR (940nm) LEDs
LED Power		Max. 1.5W per LED
Power Source (POC/ typical)		DC 12V
Startup Time upon Powered		≤200ms
Camera Current Consumption		~250mA @12V (with default settings)
Weight		38.4g
Dimensions		44.2x25x25.8 mm (FAKRA connector excluded)
Temperature	**Operating**	-40 to 85℃
	Storage	-40 to 95℃
Water/Dust Resistance		N/A

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Important Safety Instructions

For user safety, please read and follow all **instructions**, **WARNINGS**, **CAUTIONS,** and **NOTES** marked in this manual and on the associated equipment before handling/operating the equipment.

1. Read these safety instructions carefully.
2. Keep this user's manual for future reference.
3. Read the specifications section of this manual for detailed information on the operating environment of this equipment.
4. The equipment can be operated at an ambient temperature of 40°C.
5. When installing/mounting or uninstalling/removing equipment; or when removal of the chassis lid required for user servicing (Section 3.1-3.5):
   - Turn off power and unplug any power cords/cables, and
   - Reinstall the chassis lid before restoring power.



Hazardous moving parts. Keep body parts out of the motion path.

6. To avoid electrical shock and/or damage to equipment:
   - Keep equipment away from water or liquid sources;
   - Keep equipment away from high heat or high humidity;
   - Keep equipment properly ventilated (do not block or cover ventilation openings);
   - Make sure to use recommended voltage and power source settings;
   - Always install and operate equipment near an easily accessible electrical socket-outlet;
   - Secure the power cord (do not place any object on/over the power cord);
   - Only install/attach and operate equipment on stable surfaces and/or recommended mountings;
   - If the equipment will not be used for long periods of time, turn off and unplug the equipment from its power source.
   - The power cord must be connected to a socket or outlet with a ground connection.
7. Never attempt to fix the equipment. Equipment should only be serviced by qualified personnel.
8. A Lithium-type battery may be provided for uninterrupted, backup or emergency power.



Risk of explosion if battery is replaced with one of an incorrect type. Please dispose of used batteries appropriately.

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9. This equipment is not suitable for use in locations where children are likely to be present.
10. Equipment must be serviced by authorized technicians when:
    - The power cord or plug is damaged;
    - Liquid has penetrated the equipment;
    - It has been exposed to high humidity/moisture;
    - It is not functioning or does not function according to the user's manual;
    - It has been dropped and/or damaged; and/or,
    - It has an obvious sign of breakage.
11. Please pay strict attention to all warnings and advisories appearing on the device, to avoid injury or damage.
12. The equipment may have more than one power supply input. To reduce the risk of electrical shock, trained personnel should disconnect all power supply inputs before servicing.



Shock hazard! Disconnect all power supply inputs before servicing.



Shock hazard!
Risque d'électrocution!



Multiple power sources
Sources d'alimentation multiples

13. It is recommended that equipment be installed only in a server room or computer room where access is:
    - Restricted to qualified service personnel or users familiar with restrictions applied to the location, reasons therefor, and any precautions required;
    - Only afforded by the use of a tool or lock and key, or other means of security, and is controlled by the authority responsible for the location.
14. Suitable for installation in Information Technology Rooms in accordance with Article 645 of the National Electrical Code and NFPA 75.

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Consignes de Sécurité Importantes

Pour assurer la sécurité de l'utilisateur, veuillez lire et suivre toutes les **directives**, ainsi que les **AVERTISSEMENTS**, **MISES EN GARDE** et **REMARQUES** de ce manuel et indiqués sur l'équipement associé avant de manipuler ou utiliser l'équipement.

1. Veuillez lire attentivement ces instructions de sécurité avec soin.
2. Veuillez conserver ce manuel pour référence future.
3. Veuillez lire la section des spécifications de ce manuel pour avoir des informations détaillées sur l'environnement d'exploitation de cet équipement.
4. L'équipement peut être utilisé à une température ambiante de 40 °C.
5. Lors de l'installation ou du montage et de la désinstallation ou de la dépose de l'équipement; ou lors de la dépose du couvercle du châssis pour procéder à l'entretien par l'utilisateur (Sections 3.1-3.5):
   - Coupez l'alimentation et débranchez les cordons et les câbles d'alimentation, et
   - Reposez le couvercle du châssis avant de remettre l'alimentation.



Pièces mobiles dangereuses. Gardez les parties du corps hors de la trajectoire.

6. Pour éviter un risque d'électrocution et pour éviter d'endommager l'équipement :
   - Éloignez l'équipement de l'eau et de toute source liquide;
   - Éloignez l'équipement de toute source de chaleur ou d'humidité élevée;
   - Gardez l'équipement correctement ventilé (ne pas bloquer ou couvrir les ouvertures de ventilation);
   - Veillez à utiliser la tension recommandée et les réglages adéquats pour la source d'alimentation;
   - Veuillez toujours installer et exploiter l'équipement à proximité d'une prise de courant facilement accessible;
   - Assurez-vous que le cordon d'alimentation est acheminé de manière sécuritaire (ne déposez aucun objet dessus);
   - Installez, fixez et utilisez l'équipement sur des surfaces stables ou sur les fixations recommandées uniquement;
   - Si l'équipement n'est pas utilisé pendant une longue période, éteignez-le et débranchez-le de sa source d'alimentation.
   - Le cordon d'alimentation doit être connecté à une prise ou à une prise de courant avec mise à la terre.
7. N'essayez jamais de réparer l'équipement. L'équipement ne doit être réparé que par du personnel qualifié.
8. Une pile au lithium peut être installée pour assurer l'alimentation de secours ou d'urgence en continu.



Risque d'explosion si la batterie est remplacée par une batterie d'un type incorrect. Veuillez éliminer les piles usagées de manière appropriée.

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9. Cet équipement ne convient pas à une utilisation dans des lieux pouvant accueillir des enfants.
10. L'équipement doit être entretenu par des techniciens agréés lorsque :
    - le cordon d'alimentation est endommagé ou lorsque la fiche électrique est endommagée;
    - du liquide a pénétré à l'intérieur de l'équipement;
    - l'équipement a été exposé à un taux d'humidité élevé;
    - l'équipement ne fonctionne pas ou ne fonctionne pas conformément au manuel de l'utilisateur;
    - l'équipement est tombé ou lorsqu'il a été endommagé;
    - l'équipement présente un signe évident de défaillance.
11. Veuillez porter une attention rigoureuse à tous les avertissements et à tous les avis figurant sur l'appareil, pour éviter des blessures ou des dommages.
12. L'équipement peut avoir plus d'une entrée d'alimentation. Pour réduire le risque d'électrocution, le personnel qualifié devrait déconnecter toutes les entrées d'alimentation avant de procéder à l'entretien.



Risque d'électrocution! Débranchez toutes les entrées d'alimentation avant de procéder à l'entretien.



Shock hazard!
Risque d'électrocution!



Multiple power sources
Sources d'alimentation multiples

13. Il est recommandé que l'équipement soit installé que dans une salle de serveur ou de la salle informatique où:
    - L'accès est limité au personnel de maintenance qualifié ou utilisateurs familiers avec les restrictions appliquées à l'emplacement, motifs, et tout les précautions nécessaires, et;
    - L'accès est uniquement assurée par l'utilisation d'un outil ou clé, ou d'autres moyens de sécurité, et est contrôlé par l'autorité responsable de l'emplacement.
14. Peut être installé dans des salles de matériel de traitement de l'information conformément à l'article 645 du National Electrical Code et à la NFPA 75.

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Getting Service

Ask an Expert: https://www.adlinktech.com/en/Askanexpert

ADLINK Technology, Inc.
Address: No. 66, Huaya 1st Rd., Guishan District
Taoyuan City 333411, Taiwan
333411 桃園市龜山區華亞一路 66 號
Tel: +886-3-216-5088
Fax: +886-3-328-5706
Email: service@adlinktech.com

Ampro ADLINK Technology, Inc.
Address: 6450 Via Del Oro, San Jose, CA 95119-1208, USA
Tel: +1-408-360-0200
Toll Free: +1-800-966-5200 (USA only)
Fax: +1-408-600-1189
Email: info@adlinktech.com

ADLINK Technology (China) Co., Ltd.
Address: 上海市浦东新区张江高科技园区芳春路 300 号 (201203)
300 Fang Chun Rd., Zhangjiang Hi-Tech Park, Pudong New Area
Shanghai, 201203 China
Tel: +86-21-5132-8988
Fax: +86-21-5132-3588
Email: market@adlinktech.com

ADLINK Technology GmbH
Address: Hans-Thoma-Strasse 11, D-68163, Mannheim, Germany
Tel: +49-621-43214-0
Fax: +49-621 43214-30
Email: emea@adlinktech.com

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