

User Manual

VPS-3100 電腦

Vision System

限用物質含有情況標示聲明書



設備名稱 : Equipment na	電腦 me		型號 (型式): VPS-3100 Series VPS-3100I-10A; VPS-3100L-10A; VPS-3100F-10A; VPS-3100I10A-T; VPS3100I10A-ES Type Designation (Type)			
			限用物質 Restricte	質及其化學符號 ed Substance	號 SS	
單元 Unit	鉛 Lead (Pb)	汞 Mercury (Hg)	鎘 Cadmium (Cd)	六價鉻 Hexavalent chromium (Cr ⁺⁶)	多溴聯苯 Polybromina ted biphenyls (PBB)	多溴二苯醚 Polybrominate d diphenyl ethers (PBDE)
電路板	_	0	0	0	0	0
内外殼	0	0	0	0	0	0
其它固定組件 (螺絲、夾 具、卡榫)		0	0	0	0	0
散熱模組	0	0	0	0	0	0
備考1. "超出 0.1 wt%"及 "超出 0.01 wt%" 係指限用物質之百分比含量超出百分比含量 基準值。 Note 1. "Exceeds 0.1 wt%" and "exceeds 0.01 wt%" indicate that the weight percentage con- tent of the restricted substance exceeds the presence condition reference value. 備考 2. "○" 係指該項限用物質之百分比含量未超出百分比含量基準值。 Note 2. "○" indicates that the weight percentage content of the restricted substance does not						
exceed the presence condition reference value.						

備考 3. "一" 係指該項限用物質為排除項目。 Note 3. The "—" indicates that the restricted substance meets the exemption criteria.

Attention!

This package contains a hard copy of the user manual in Chinese for China CCC certification purposes. Please disregard the Chinese version if the product is not to be sold and/or installed in China.

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Product Warranty (2 years)

Advantech warrants to you, the original purchaser, that this product will be free from defects in materials and workmanship for 2 years from the date of purchase.

This warranty does not apply to products that have been repaired or altered by persons other than repair personnel authorized by Advantech , nor does it apply to products that have been subject to misuse, abuse, accident, or improper installation. Under the terms of this warranty, Advantech assumes no liability for consequences arising from such events.

Because of Advantech's high quality-control standards and rigorous testing, most of our customers never need to use our repair service. If an Advantech product is defective, it will be repaired or replaced at no charge during the warranty period. For outof-warranty repairs, you will be billed according to the cost of replacement materials, service time, and freight. Please consult your dealer for more details.

If you believe that you have a defective product, follow these steps:

- 1. Collect all the information about the problem encountered (e.g., CPU speed, Advantech products used, other hardware and software used, etc.). Note anything abnormal and list any on-screen messages that appear when the problem occurs.
- 2. Call your dealer and describe the problem. Please have your manual, product, and any helpful information readily available.
- If your product is diagnosed as defective, obtain a return merchandize authorization (RMA) number from your dealer. This allows us to process your return more quickly.
- 4. Carefully pack the defective product, a fully completed Repair and Replacement Order Card, and proof of purchase date (e.g., a photocopy of your sales receipt) in a shippable container. A product returned without proof of the purchase date is not eligible for warranty service.
- 5. Write the RMA number clearly on the outside of the package and ship it prepaid to your dealer.

Declaration of Conformity

FCC Class A

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio-frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his or her own expense.

警告使用者

這是甲類測試產品,在居住的環境中使用時,可能會造成射頻干擾,在這種情況下, 使用者會被要求採取某些適當的對策。

The power supply for this product is intended to be a UL-certified power supply or a UL-certified DC power source (rating, 24 V_{DC} , min. 3 A, min. 50°C). Please contact Advantech for further information. Note: The power adapter is an optional accessory.

Technical Support and Assistance

- 1. Visit the Advantech website at www.advantech.com/support for the latest information about this product.
- 2. Should you require additional assistance, contact your distributor, sales representative, or Advantech's customer service center for technical support. Please have the following information ready before you call:
 - Product name and serial number
 - Description of your peripheral attachments
 - Description of your software (OS, version, application software, etc.)
 - A complete description of the problem
 - The exact wording of any error messages

Packing List

Before installation, please ensure the following items have been shipped:

- VPS-3100 barebone system x1
- Startup manual x1
- 2-pin phoenix connector x 1
- 4-pin phoenix connector x 1
- 10-pin phoenix connector x 1
- Wall mount bracket x 2
- DIN rail mount bracket x 1

Ordering Information

Part Number	Camera Interface	Display	USB 3.0	lsolated Digital I/O	COM 1	COM 2
VPS-3100I-10A	2-CH GigE PoE	VGA DP++	4	2-ch input 4-ch output	1	1

Optional Accessories

Part Number	Description
1950016395T102	DIN rail bracket
96PSA-A120W24T2	ADP 100–240-V 120-W 24-V end terminal (FSP120-AAAN2)
96FD-M064-PLG1	mSATA, A19nm, 64 GB, SATA 6 GB/s, 0~70°C
96FD-M128-PLG1	mSATA, A19nm, 128 GB, SATA 6 GB/s, 0~70°C

Warnings, Cautions, and Notes



Warning! Warnings indicate conditions, which if not observed, can cause personal injury!



Caution! Cautions are included to help you avoid hardware damage or data loss. Example:



New batteries may explode if incorrectly installed. Do not attempt to recharge, force open, or heat the battery. Replace the battery only with the same or equivalent type recommended by the manufacturer. Discard used batteries according to the manufacturer's instructions.

Caution! Danger of explosion if battery is incorrectly replaced. Replace only with the same or equivalent type recommended by the manufacturer, discard used batteries according to the manufacturer's instructions.



Caution! Danger d'explosion si la batterie est inexactement remplacee. Remplacez seulement avec la meme chose ou le type equivalent recommande par le fabricant, jettent les batteries utilisees instructions de s selon fabricant des'.



Notes provide optional additional information.

Battery Information

Batteries, battery packs, and accumulators should not be disposed of as unsorted household waste.

Please use your local public collection system to return, recycle, or treat them in compliance with the local regulations.



Safety Instructions

- 1. Read these safety instructions carefully.
- 2. Keep this user manual for later reference.
- 3. Disconnect the equipment from any AC outlet before cleaning. Use a damp cloth. Do not use liquid or spray detergents for cleaning.
- 4. For plug-in equipment, the power outlet socket must be located near the equipment and must be easily accessible.
- 5. Keep the equipment away from humidity.
- 6. Place the equipment on a stable surface during installation. Dropping it or letting it fall may cause damage.
- 7. The openings on the enclosure are for air convection. To 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 so that people cannot step on it. Do not place anything over the power cord.
- 10. Pay attention to all cautions and warnings noted on the equipment.
- 11. If the equipment is not used for a long time, disconnect it from the power source to avoid damage from transient overvoltage.
- 12. Never pour any liquid into the openings. This may cause fire or electrical shock.
- 13. Never open the equipment. For safety reasons, the equipment should be opened only by qualified service personnel.
- 14. If one of the following situations arises, get the equipment checked by service personnel:
 - The power cord or plug is damaged.
 - Liquid has penetrated into the equipment.
 - The equipment has been exposed to moisture.
 - The equipment does not work well, or you cannot get it to work according to the user manual.
 - The equipment has been dropped and damaged.
 - The equipment has obvious signs of breakage.
- 15. Do not store this equipment in an environment where the temperature may go below -20°C (-4°F) or above 60°C (140°F). This could damage the equipment. The equipment should be kept in a controlled environment.
- 16. **CAUTION**: The battery may explode if it is incorrectly replaced. Replace only with the same or equivalent type recommended by the manufacturer, and discard used batteries in accordance with the manufacturer's instructions.
- 17. In accordance with IEC 704-1:1982, the sound pressure level at the operator's position will not exceed 70 dB (A).
- 18. RESTRICTED ACCESS AREA: The equipment should only be installed in a restricted access area.

DISCLAIMER: This set of instructions is given in accordance with IEC 704-1. Advantech disclaims all responsibility for the accuracy of any statements contained herein.

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VPS-3100 User Manual



Introduction

This chapter gives background information on the VPS-3100.

1.1 Introduction

The VPS-3100 is a compact fanless system incorporating an Intel® SoC. It is designed specifically for machine vision applications. The system is an independent embedded box with a rugged aluminum case that is resistant against thermal exposure as well as high electromagnetic interference, shock, and vibration. It features an Intel® quad-core processor and a proprietary 2-channel power-over-Ethernet (PoE) camera module, making it a suitable solution for machine vision applications. It also features a diverse I/O interface that includes Ethernet, USB 3.0, and serial ports.

1.2 Product Features

1.2.1 General

- CPU: Intel® Celeron® Processor N3160
- PCH: N/A
- System Memory: Onboard DDR3L RAM, 1600 MHz, 4 GB
- Storage: Supports one mSATA SSD
- Graphics: VGA and DP++
- Ethernet Port: 1 x RJ45
- Watchdog Timer: Single-chip watchdog 255-level interval timer, setup by software
- I/O Interface: 1 x RS232/422/485 and 1 x RS-232
- **USB:** 4 x USB 3.0

1.2.2 Display

- **Chipset:** Intel[®] HD Graphics 400 (supports DirectX 12)
- Graphics Video Max Memory: 4 GB
- Resolution:
 - VGA: Supports up to 1920 x 1080 @ 60 Hz
 - DP: Supports up to 3840 x1080 @ 30 Hz

1.2.3 Ethernet

- Chipset: LAN 1: Intel® i210IT
- **Speed:** 10/100/1000 Mbps
- Interface: 1 x RJ45
- **Standards:** Compliant with IEEE 802.3, IEEE802.3U, IEEE 802.ab.

Chapter 1 Introduction

1.3 Chipset

1.3.1 Functional Specifications

Processor	Intel® Celeron® Processor N3160					
Memory	Supports ondoard DDR3L RAM, 1600 MHZ, 4 GB					
	Intel® HD Graphics 400					
	– Supports DirectX 12 (Windows 10)					
	- Supports DirectX 11.x (Windows 7/8.1)					
Obine et late avete d	- Supports OpenGL 4.2					
Intel® HD Graphic	- Supports Intel® Quick Sync Video					
·	I/O interface					
	 – VGA: Supports up to 1920 x 1200 @ 60 Hz 					
	(VGA connector: Onboard D-SUB 15P)					
	– -DP++: Supports up to 3840 x 2160 @ 30 Hz					
SATA Interface	One SATA 3.0 port					
	USB host interface for 4 x USB 3.0 ports					
USB Interface	Supports high-speed, full-speed, and low-speed modes					
	Supports legacy keyboard/mouse software					
	Supports ACPI 5.0					
Power Management	 Supports ACPI power management logic 					
	Power connector: Plug-in block 2Px1					
BIOS	AMI 64Mb Flash BIOS via SPI					
	Nuvoton NCT6106D supports up to 6 serial ports					
	High-speed NS16C550A-compatible UARTs with data rates					
	up to 1.5 Mbps					
Serial Ports	Supports IRQ sharing among serial ports on XPE					
	COM 1: Supports RS-232/422/485 with BIOS setup, supports					
	auto flow control					
	COM 2: Supports RS-232 serial port connector: D-SUB					
	CON.9P					
	LAN1: Intel® i210IT					
ΙΔΝ	Compliant with IEEE 802.3, IEEE 802.3u, IEEE 802.ab.					
	Supports 10/100/1000 Mbps					
	Supports wake-on-LAN					
Battery	BR2032 3 V/190 mAh					

1.4 Mechanical Specifications

1.4.1 Dimensions



Figure 1.1 VPS-3100 dimensions

1.4.2 Weight

1.1 kg (2.43 lb)

1.5 Power Requirements

1.5.1 System Power

Minimum power input: 24V_{DC} (+10%)

1.5.2 RTC Battery

BR2032 3 V/190 mAh

1.6 Environmental Specifications

- **1.6.1** Operating Temperature 0~50°C
- **1.6.2** System Safety Certification Test Temperature 0~50°C with mSATA
- **1.6.3** Relative Humidity 0~95% @ 40°C (non-condensing)
- **1.6.4** Storage Temperature -40~85°C (-40~185°F)

1.6.5 Vibration During Operation

When the system is equipped with an mSATA SSD: 3 Grms, IEC 60068-2-64, random, $5\sim500$ Hz, 1 octave/min, 1 hr/axis, 3 axes (x,y,z).

1.6.6 Shock During Operation

When the system is equipped with an mSATA SSD: 20 G, IEC 60068-2-27, half sine, 11-ms duration.

1.6.7 Safety

CCC, CB, UL

1.6.8 EMC

CE, FCC, CCC, KCC, BSMI

VPS-3100 User Manual



H/W Installation

This chapter introduces external I/O and installation of the VPS-3100 hard-ware.

2.1 Introduction

The following figures show the connectors on the equipment. The following sections describe each peripheral.

2.2 Jumpers

2.2.1 Jumper Description

The VPS-3100 can be configured to match your application needs by adjusting the jumper settings. To close a jumper, place the jumper over the jumper pins; to open a jumper, remove the jumper from the pins. In the following example, the jumper block has three pins (labeled 1, 2, and 3). In this case, the jumper can be closed by covering either Pins 1-2 or Pins 2-3.





open

closed 2-3

The jumper settings described in this manual are depicted as follows:

closed



A pair of needle-nose pliers may be helpful when working with jumpers. If you have any doubts about the ideal hardware configuration for your application, contact your local distributor or sales representative before making any changes.

2.2.2 Jumper List

Table 2.1: Jumper List				
Label	Function			
JCMOS1	Clear CMOS			
PSON1	System AT/ATX mode			
JWDT1_JOBS1	Watchdog mode			

2.2.2.1 Clear CMOS

On the VPS-3100, the CMOS1 jumper allows you to clear the CMOS data and reset the system BIOS settings. Normally, this jumper is set to 1-2 closed. To reset the CMOS settings, set it to 2-3 closed for a few seconds, and then move the jumper back to 1-2 closed.

CMOS1	Clear CMOS
Footprint	3x1 pin
Setting	Function
(1-2)	Normal (default)
(2-3)	Clear CMOS

2.2.2.2 System AT/ATX Mode

The VPS-3100 supports AT or ATX mode (default = ATX). To switch to AT mode, locate the AT/ATX mode jumper (PSON1) on the motherboard.

PSON1	System AT/ATX Mode
Footprint	3x1 pin
Setting	Function
(1-2)	AT mode
(2-3)	ATX mode

2.2.2.3 System Watchdog Mode

The VPS-3100 contains a jumper (JWDT1_JOBS1) that can activate watchdog mode.

JWDT1_JOBS1	Watchdog Mode
Footprint	5x1 pin
Setting	Function
(2-3)	Watchdog
(4-5)	ERR_BEEP

2.3 Connectors

2.3.1 VPS-3100 External I/O Connectors

Front View



Rear View





2.3.1.1 COM Connector

Table 2.2: COM Connector Pin Assignment Chart			
	RS-232	RS-422	RS-485
Pin	Signal Name	Signal Name	Signal Name
1	DCD	Tx-	DATA-
2	RxD	Tx+	DATA+
3	TxD	Rx+	NC
4	DTR	Rx-	NC
5	GND	GND	GND
6	DSR	NC	NC
7	RTS	NC	NC
8	CTS	NC	NC
9	RI	NC	NC



Note! NC = "no connection"



2.3.1.2 Ethernet Connector (LAN)

The VPS-3100 is equipped with two Ethernet controllers compliant with IEEE 802.3u 10/100/1000 Mbps CSMA/CD standards. LAN1 is an Intel® i210IT Ethernet controller. The Ethernet port has a standard RJ45 jack connector with LED indicators on the front side to show the active/link and speed status.



Figure 2.2 Ethernet connector

Table 2.3: Ethernet Connector Pin Assignment Chart		
Pin	10/100/1000BaseT Signal Name	
1	TX+	
2	TX-	
3	RX+	
4	MDI2+	
5	MDI2-	
6	RX-	
7	MDI3+	
8	MDI3-	

2.3.1.3 USB 3.0 Connector

The VPS-3100 has four USB 3.0 ports for Plug and Play (PnP) and hot-swapping for up to 127 external devices. The USB interface complies with USB XHCI, Rev. 3.0. Please refer to the following table for pin assignments.



Figure 2.3 USB 3.0 connector

Table 2.4: USB 3.0 Connector Pin Assignment Chart		
Pin	Signal Name	
1	+5 V	
2	USB data-	
3	USB data+	
4	GND	
5	SSRX-	
6	SSRX+	
7	GND	
8	SSTX-	
9	SSTX+	

2.3.1.4 VGA Connector

The VPS-3100 has a high-resolution VGA interface with a 15-pin D-sub connector for VGA CRT monitors. The maximum resolution is 1920 x 1200 @ 60 Hz.



Figure 2.4 VGA connector

Table 2.5: VGA Connector Pin Assignment Chart			
Pin	Signal Name	Pin	Signal Name
1	Red	2	Green
3	Blue	4	NC
5	GND	6	GND
7	GND	8	GND
9	+5 V	10	GND
11	NC	12	DDC_DAT
13	H-SYNC	14	V-SYNC
15	DDC_CLK		

2.3.1.5 DP++ Connector

The VPS-3100 also has a high-resolution DP++ interface powered by an Intel® QM170 accelerator. It integrates both analog and digital video signals and has a maximum display resolution of $3840 \times 2160 \otimes 30$ Hz.



Figure 2.5 DP++ connector

Table 2.6	: DP Port Connector Pin A	ssignment	t Chart
Pin	Signal Name	Pin	Signal Name
1	TMDS data 2-	2	TMDS data 2+
3	GND	4	N/C
5	N/C	6	DDC clock
7	DDC data	8	N/C
9	TMDS data 1-	10	TMDS data 1+
11	GND	12	N/C
13	N/C	14	+5 V
15	GND	16	Hot plug detect
17	TMDS data 0-	18	TMDS data 0+
19	GND	20	N/C
21	N/C	22	GND
23	TMDS clock +	24	TMDS clock -
C1	N/C	C2	N/C

Table 2.6	: DP Port Connector Pin	Assignmen	t Chart
C3	N/C	C4	N/C
C5	N/C		

2.3.1.6 Power Input Connector

The VPS-3100 has a two-pin header as the default power input, supporting an external power source of 12~24 $V_{DC}{\rm .}$



Figure 2.6 2-pin header

Table 2.7: Power Connector Pin Header Pin Assignment Chart		
Pin	Signal Name	
1	GND	
2	+12~24 V _{DC}	

2.3.1.7 Power ON/OFF Button

The power button is located on the front panel of the VPS-3100. The LED indicator shows whether the power status is on (green) or off/power suspend (red). Note that the device also supports soft power on/off (instant off or delay 4 seconds).



Figure 2.7 Power button

2.3.1.8 LED Indicators

The VPS-3100 has an HDD and thermal LED for data transmission status monitoring.

2.3.1.9 Strobe Connector

The VPS-3100 has a four-pin connector for strobe control.



Figure 2.8 Strobe connector



Figure 2.9 Strobe timing settings

2.3.1.10 Digital I/O Connector

The VPS-3100 has a 10-pin connector for digital I/O control.



Figure 2.10 Digital I/O connector

Table 2.8: Digital I/O Connector Pin Assignment Chart			
Pin	Signal Name	Pin	Signal Name
1	CAM1 DI	2	CAM2 DI
3	COM DI	4	N/C
5	DO +VIN	6	CAM1 DO0
7	CAM1 DO1	8	CAM2 DO0
9	CAM2 DO1	10	Digital I/O GND

Signal Connections:

Isolated Digital Input (Dry Contact)







ton: 10us Typ.; toff: 60us Typ. (Vin settling time is not included)

Figure 2.12 Isolated digital input response time (dry contact)

Each isolated digital input channel can accept a voltage input below $30 V_{DC}$. In addition, all channels share the same common pin. Figure 2.12 shows how to connect an external input source to one of the VPS-3100's isolated input channels.

Isolated Digital Input (Wet Contact)



Figure 2.13 Isolated digital input connection (wet contact)

Isolated Digital Output:



Figure 2.14 Isolated digital output connection



ton: 10us Typ.; tom: 60us Typ. (Voc settling time is not included)

Figure 2.15 Isolated digital output response time

External power sources to DO +VIN (Pin 5) must be within 11~35 V_{DC} in order to supply an electric current to external loads via each digital output channel (Pins 6~9). The current drawn from each digital output channel must not exceed 500 mA, or the device may be permanently damaged. The VPS-3100 has an automatic shutdown mechanism for if a digital output is short-circuited.

2.4 Installation

2.4.1 mSATA SSD Installation

VPS-3100 series supports 1 x mSATA SSD links.

- 1. Remove the chassis screws and bottom cover
- 2. Install the module in the mSATA socket, apply the thermal pad, and then secure the drive with screws
- 3. Replace the bottom cover and secure with screws







Figure 2.17 Install mSATA SSD



AMI BIOS Setup

This chapter introduces how to configure the BIOS settings.

3.1 Introduction

AMI's Aptios Setup Utility enables you to modify the BIOS settings and control the special features of your computer. This chapter describes the VPS-3100 setup screens.

Aptio Setup Utility – Main Advanced Chipset Security	Copyright (C) 2016 American Boot Save & Exit	Megatrends, Inc.
BIOS Information BIOS Vendor Core Version Compliancy Project Version Build Date and Time Access Level	American Megatrends 5.0.1.1 0.23 x64 UEFI 2.4.0; PI 1.3 AIIS 1200000060X013 04/06/2016 04:32:01 Administrator	OS selection
Memory Information Total Memory	8192 MB (LPDDR3)	
OS Selection	[Windows 7]	
Setup Item Hidden	[Enabled]	++: Select Screen 11: Select Item Enter: Select
System Date System Time	[Fri 04/22/2016] [15:21:46]	+/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit
Version 2.17.1249. Co	pyright (C) 2016 American Mo	egatrends, Inc.

3.2 How to Enter BIOS

Press **<DELETE>** or **<ESC>** during the POST process to enter the BIOS setup utility. Once inside the utility, the various settings can be accessed by selecting the **Main**, **Advanced**, **Chipset**, **Security**, **Boot**, and **Save & Exit** tabs. Use the **<ARROW>** keys to move between items and screens, and press **<ENTER>** to select an item. The **<TAB>** key can also be used to move between items.

3.2.1 Main

The utility opens with the **Main** screen, which has two main panels. The left panel displays the configurable options (dimmed items cannot be configured; blue items can), and the right panel displays navigation information (bottom right) and a description of the selected item (top right).

As shown in the figure below, there are two main settings that can be configured: OS Selection and System Date/Time.

Aptio Setup Utility - Main Advanced Chipset Security	- <mark>Copyright (C) 2016 Americar</mark> Boot Save & Exit) Megatrends, Inc.
BIOS Information BIOS Vendor Core Version Compliancy Project Version Build Date and Time Access Level	American Megatrends 5.0.1.1 0.23 x64 UEFI 2.4.0; PI 1.3 AIIS 1200000060X013 04/06/2016 04:32:01 Administrator	OS selection
Memory Information Total Memory	8192 MB (LPDDR3)	
OS Selection	[Windows 7]	
Setup Item Hidden	[Enabled]	↔: Select Screen 1↓: Select Item Enter: Select
System Date System Time	[Fri 04/22/2016] [15:21:46]	+/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit



OS Selection

This option is for selecting the OS you are using (default: Windows 7).

System Time/Date

Use this option to change the system time and date. After selecting the item you wish to edit, you can enter new values using your keyboard. Use MM/DD/YY format for the date and HH:MM:SS format for the time.

3.2.2 Advanced

The image below shows the **Advanced** screen. Select any of the items in the left panel open the corresponding submenu. The submenus are described on the following pages.

Main Advanced Chipset Security Boot Save & Exit	Megatrenus, Inc.
 ACPI Settings NCT6106D Super IO Configuration NCT6106D HW Monitor SS RTC Wake Settings Serial Port Console Redirection CPU Configuration SATA Configuration Miscellaneous Configuration PCI Subsystem Settings USB Configuration 	System ACPI Parameters.
	<pre>++: Select Screen 14: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit</pre>

3.2.2.1 ACPI Settings



- Enable ACPI Auto Configuration Enable/disable BIOS ACPI auto configuration
- Enable Hibernation
 Enable/disable hibernation
- ACPI Sleep State
 Set the ACPI sleet state to S3 (suspend to RAM) or disabled
Chapter 3 AMI BIOS Setup

3.2.2.2 Serial Port 1 Configuration

Aptio Setup Utility Advanced	– Copyright (C) 2016 America	n Megatrends, Inc.
NCT6106D Super IO Configuration Super IO Chip ▶ Serial Port 1 Configuration ▶ Serial Port 2 Configuration	NCT6106D	Set Parameters of Serial Port 1 (COMA)
		<pre>++: Select Screen 14: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit</pre>
Version 2.17.1249.	Copyright (C) 2016 American	Megatrends, Inc.



Aptio Setup Utility - Advanced	– Copyright	(C) 2016 American	Megatrends, Inc.
Serial Port 2 Configuration			Enable or Disable Serial Port
Serial Port Device Settings	[Enabled] IO=2F8h;	IRQ=3;	
Change Settings	[Auto]		
			↔: Select Screen t∔: Select Item
			Enter: Select +/-: Change Opt. F1: General Heln
			F2: Previous Values F3: Optimized Defaults
			ESC: Exit
Vencion 2 17 1249	Copupidat (C) 2016 American M	adataando Tao

Serial Port 1 Configuration

- Serial Port
 Enable/disable Serial Port 1.
- Change Settings Configure the settings for Serial Port 1. The default setting is "Auto."
- Device Mode Set the port mode. The default setting is "RS-232/422/485."

Serial Port 2 Configuration

- Serial Port Enable/disable Serial Port 2.
- Change Settings
 Configure the settings for Serial Port 2. The default setting is "Auto."
- Device Mode Set the port mode. The default setting is "RS-232."

Chapter 3 AMI BIOS Setup

3.2.2.3 NCT6106D HW Monitor

Aptio Setup Utility Advanced	– Copyright (C) 2016 American	Megatrends, Inc.
Pc Health Status System temperature1 CPU temperature VCORE	: +42°C : +31°C : +0.872 V	Select Second Mode or Minute Mode
+5VSB +5V DC_IN 3VSB VBAT	: +5.409 V : +6.115 V : +19.152 V : +3.360 V : +2.976 V	
 Digital I/O Configuration CPU Warning Temperature CPU Shutdown Temperature Wake On Ring Watch Dog Timer Watch Dog Timer Count Mode Watch Dog Timer Time out Value 	[Disabled] [Disabled] [Disabled] [Enabled] [Second Mode] 60	<pre> ++: Select Screen 1↓: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit</pre>
Version 2.17.1249.	Copyright (C) 2016 American M	egatrends, Inc.

Aptio Setup Ut. Advanced	ility – Copyright (C) 2016 Ame	rican Megatrends, Inc.
Advanced Wake system from S5	[Disabled]	Enable or disable System wake on alarm event. Select FixedTime, system will wake on the hr::min::sec specified. Select DynamicTime , System will wake on the current time + Increase minute(s) ++: Select Screen 11: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults
		F4: Save & Exit ESC: Exit
Version 2.17.	1249. Copyright (C) 2016 Ameri	can Megatrends, Inc.

- Digital I/O Configuration
 Configure the digital I/O pins.
- CPU Warning Temperature Change the settings for the CPU (PECI) warning temperature. The default setting is "Disabled."

CPU Shutdown Temperature

Change the CPU (PECI) ACPI shutdown temperature. The default setting is "Disabled."

Wake on Ring
 Enable/disable wake on ring.

Watch Dog Timer

Enable/disable the watchdog and timer settings.

3.2.2.4 S5 RTC Wake Setting

Aptio Setup Utility – C Advanced	opyright (C) 2016 American	Megatrends, Inc.
COM1 Console Redirection ▶ Console Redirection Settings	[Disabled]	Console Redirection Enable or Disable.
COM2 Console Redirection ▶ Console Redirection Settings	[Disabled]	
Legacy Console Redirection ▶ Legacy Console Redirection Settings		
Serial Port for Out-of-Band Managemen Windows Emergency Management Services Console Redirection ▶ Console Redirection Settings	t/ (EMS) [Disabled]	++: Select Screen t1: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit
Version 2.17.1249. Con	uright (C) 2016 American Me	egatrends. Inc.

Wake System from S5

Enable/disable the system to wake on an alarm event. Select "FixedTime" for the system to wake at the specified time; select "DynamicTime" for the system to wake at a fixed period (in minutes) from the current time.

3.2.2.5 Serial Port Console Redirection

Aptio Setup Utility - Advanced	Copyright (C) 2016 American	Megatrends, Inc.
CPU Configuration		Socket specific CPU Information
▶ Socket O CPU Information		
Limit CPUID Maximum Bi-directional PROCHOT Intel Virtualization Technology Power Technology	[Disabled] [Enabled] [Enabled] [Energy Efficient]	
		<pre>++: Select Screen 11: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit</pre>
Version 2.17.1249. Co	pyright (C) 2016 American M	egatrends, Inc.

COM1

Console Redirection
 Enable/disable console redirection.

COM2

- Console Redirection
 Enable/disable console redirection.
- Legacy Console Redirection Select a COM port to display the redirection of Legacy OS and Legacy OPROM messages.
- Console Redirection setting Enable/disable console redirection. Serial Port for Out-of-Band Management/Windows Emergency Management Services (EMS)

3.2.2.6 CPU Configuration

Aptio Setup Utility Advanced	– Copyright (C) 2016 Americ	can Megatrends, Inc.
Aptio Setup Utility Advanced Socket 0 CPU Information Intel(R) Celeron(R) CPU N3160 @ 1 CPU Signature Microcode Patch CPU Speed Processor Cores 64-bit Intel HT Technology Intel VT-x Technology L1 Data Cache L1 Code Cache L2 Cache L3 Cache	- Copyright (C) 2016 Americ .60GHz 406C4 404 1600 MHz 4 Supported Not Supported Supported 24 kB x 4 32 kB x 4 1024 kB x 2 Not Present	<pre>can Megatrends, Inc. ++: Select Screen ++: Select Screen +/-: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit</pre>
Version 2.17.1249.	Copyright (C) 2016 American	n Megatrends, Inc.

Socket 0 CPU Information

Screen showing an overview of CPU information

- Limit CPUID Maximum Enable/disable maximum CPUID limit
- Bi-directional PROCHOT
 Enable/disable bi-directional PROCHOT
- Intel Virtualization Technology Enable/disable Intel® Virtualization Technology

Power Technology

Can be set to "Disabled," "Energy Efficient," "Custom Power Management"



Selecting custom feature can modify setting of EIST, Turbo, P-Sate coordination, and Package C state limit.



3.2.2.7 SATA Configuration

Aptio Setup Uti: Advanced	Lity — Copyright (C) 2016 An	merican Megatrends, Inc.
SATA Configuration		Enable/Disable SATA Device
STAT Controller SATA Mode Selection SATA Interface Speed Aggressive LPM Support	[Enabled] [AHCI] [Gen3] [Enabled]	
SATA PortO TS64ASTME0000A (64.0GB) Port O Spin Up Device Device Sleep Support	[Enabled] [Disabled] [Disabled]	
SATA Port1 Not Present Port 1 Spin Up Device Device Sleep Support	[Enabled] [Disabled] [Disabled]	<pre>++: Select Screen 1↓: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit</pre>
Version 2.17.12	249. Copyright (C) 2016 Amer	rican Megatrends, Inc.

SATA Controller(S)

Enable/disable SATA controller(s)

- SATA Mode Selection The VPS-3100 only supports AHCI mode
- SATA Interface Speed
 Can be set to "Gen3," "Gen2," or "Gen1"
- Aggressive LPM Support Set this to "Enable" to allow the platform controller hub to enter a low-power state

Serial ATA Port 0~1

- Port 0~1 Enable/disable Port 0 device
- Spin-Up Device
 Enable/disable spin-up device
- Device Sleep Support
 Enable/disable support for device sleep

3.2.2.8 Miscellaneous Configuration



SMBus Support

Enable/disable SMBus support

- Serial IRQ
 Enable/disable serial IRQ support
- Serial IRQ Mode Set the serial IRQ mode. The default setting is "Continuous."

3.2.2.9 USB Configuration

Aptio Setup Utility – Advanced	Copyright (C) 2016 American	Megatrends, Inc.
USB Configuration		Enables Legacy USB support.
USB Module Version	11	support if no USB devices are connected. DISABLE option will
USB Controllers: 1 XHCI		keep USB devices available only for EFI applications.
USB Devices: 1 Drive, 1 Keyboard		
Legacy USB Support XHCI Hand–off USB Mass Storage Driver Support	(Enabled) [Disabled] [Enabled]	
Port 60/64 Emulation	[Disabled]	↔: Select Screen
USB hardware delays and time-outs:		†↓: Select Item
USB transfer time-out	[20 SEC] [20 SEC]	Enter: Select
Device power-up delay	[Auto]	F1: General Help F2: Previous Values
Mass Storage Devices:	[Auto]	F3: Optimized Defaults
	[Huto]	ESC: Exit
Version 2.17.1249. Co	pyright (C) 2016 American M	egatrends, Inc.

Legacy USB Support

Enable/disable Legacy USB support. This also has an "Auto" option.

XHCI Hand-Off

Enable/disable XHCI hand-off.

- USB Mass Storage Driver Support Enable/disable support for USB mass storage drivers.
- Port 60/64 Emulation
 Enable/disable Port 60/64 emulation.
- USB Transfer Time-Out
 Set the time for USB transfer time-outs.
- Device Reset Time-Out Set the time for device reset time-outs.
- Device Power-Up Delay
 Set the time for device power-up delay.

3.2.3 Chipset



Aptio Setup Chipset	Utility – Copyright	(C) 2016 American	Megatrends, Inc.
▶ Intel IGD Configuration			Config Intel IGD Settings.
Memory Information			
Total Memory	8192 MB	(LPDDR3)	
Memory Slot0 Memory Slot2	4096 MB 4096 MB	(LPDDR3) (LPDDR3)	
			<pre>++: Select Screen 11: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit</pre>
Version 2.	17.1249. Copyright (C) 2016 American Me	egatrends, Inc.

	Coloct the ICD Turks forture
[Auto] [Auto] [32M] [256MB] [256MB] [4MB]	if Auto selected, IGD Turbo will only be enabled when SOC steeping is BO or above.
	<pre>++: Select Screen 11: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit</pre>
	[Auto] [32M] [256MB] [256MB] [4MB] [4MB] 249. Copyright (C) 2016 Ameri

IGD Turbo

Enable/disable Intel® integrated graphics turbo support. This also has an "Auto" option.

Primary Display

Select the primary display.

DVMT Pre-Allocated

Pre-allocate a fixed amount of dynamic video memory technology (DVMT) to the internal graphics device.

DVMT Total Gfx Mem Set the maximum amount of DVMT that can be allocated to the internal graphics device. Aperture Size

Set the graphics aperture size.

GTT Size

Set the size of the graphics translation table (GTT).

3.2.3.1 USB Configuration



Apt	io Setup Utility – Copyright <mark>Chipset</mark>	(C) 2016 American	Megatrends, Inc.
USB Configuration XHCI Mode	[Enabled]		Mode of operation of xHCI controller
			<pre>++: Select Screen 14: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit</pre>
Ve	rsion 2.17.1249. Copyright (C) 2016 American M	egatrends, Inc.

USB Configuration Enable/disable XHCI mode

- Restore On AC Power Loss
 Set what happens when AC power is lost and then restored.
- LAN Controller

Enable/disable the LAN controller

- Wake on LAN (WoL) Enable/disable WoL support
- LAN PXE OpROM Enable/disable LAN PXE support

3.2.4 Security



Administrator Password

Set the administrator password (optional).

User Password

Set the user password (optional).

3.2.5 Boot



Setup Prompt Time-Out

Number of seconds to wait for setup activation key. 65535 (0xFFF) means indefinite waiting.

- Boot-Up Num Lock State Set whether the Num Lock is on or off at boot-up.
- Quiet Boot
 Enable/disable quiet boot.
- Boot Option Priorities

_

Note! The items displayed will be based on the number of attached devices.



Boot Option #2

Boot Option #1

3.2.6 Save & Exit

Aptio Setup Utility – Copyright (C) 2016 Ameri Main Advanced Chipset Security Boot <mark>Save & Exit</mark>	ican Megatrends, Inc.
Save Options Save Changes and Exit Discard Changes and Exit	Exit system setup after saving the changes.
Save Changes and Reset Discard Changes and Reset	
Save Changes Discard Changes	
Default Options Restore Defaults Save as User Defaults	
Restore User Defaults	↔: Select Screen ↑↓: Select Item
Boot Overnide Disabled in BBS Order	Enter: Select +/-: Change Opt.
UEFI: Generic Flash Disk 8.07, Partition 1	F1: General Help
Launch EFI Shell from filesystem device	F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit
Version 2.17.1249. Copyright (C) 2016 America	an Megatrends, Inc.

- Save Changes and Exit Save any changes and then exit BIOS.
- Discard Changes and Exit
 Discard any changes and then exit BIOS.
- Save Changes and Reset
 Save any changes and the reset the system.
- Discard Changes and Reset
 Discard any changes and then reset the system.
- Save Changes Save any changes without exiting.
- Discard Changes
 Discard any changes without exiting.
- Restore Defaults
 Restore the factory default settings.
- Save as User Defaults Saves the current settings as under "User Defaults."
- Restore User Defaults Restores settings previously saved under "User Defaults."
- Launch EFI Shell from Filesystem Device Attempts to launch the EFI Shell application (Shell.efi) form an available filesystem devices.

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Software Installation

This chapter introduces the driver installation procedure.

Chipset Software Installation Utility 4.1

4.1.1 Before You Begin

To facilitate the installation of the enhanced display drivers and utility software, read the instructions in this chapter carefully.

Before you begin, it is important to note that most display drivers require the relevant software application to already be installed prior to installing the enhanced display drivers. In addition, many of the installation procedures assume that you are familiar with both the relevant software applications and operating system commands. Review the relevant operating system commands and pertinent sections of your application software's user manual before performing the installation.

4.1.2 Introduction

The Intel® Chipset Software Installation (CSI) Utility installs INF files to inform the OS how the chipset components will be configured. This is needed for the proper functioning of the following features:

- Core PCI PnP services
- Serial ATA interface support
- USB 1.1/2.0 support
- Identification of Intel® chipset components in Device Manager.

Note!

The chipset driver must be installed before installing all the other drivers. It is used for the following versions of Windows:

Windows 10 (64-bit)

- Windows 7 (32-bit)
- Windows 7 (64-bit)



Caution! Only the latest generation Intel® platforms feature a USB 3.0 host controller. Since the official Windows 7 release does not include a USB 3.0 driver. Windows 7 can be installed using a SATA interface driver (SATA CD-ROM or CFast or m-SATA) or a version of Windows that has a preloaded USB 3.0 driver.

> Please contact your regional application engineer for a preloaded Windows 7 image.

Advantech supports Windows 7 installations from USB 3.0 devices (EFI OS not supported). For information on how to do this, please contact your distributor or sales representative.

4.2 Integrated Graphics Device Setup

4.2.1 Introduction

The latest generation of Intel® processors feature integrated graphics controllers. The VGA driver must be installed to enable this function, which includes the following features:

Optimized integrated graphics solution: the Intel® Flexible Display Interface offers versatile display options and 32-bit 3D graphics engine support. Dual independent displays and enhanced display modes for widescreen flat panels include extended, twin, and cloned dual display modes, and optimized 3D support delivers an intensive and realistic visual experience.

Caution! Known issue: Intel® 15.40 series VGA drivers cannot complete driver installation once the IGD turbo function has been disabled.



4.2.2 Windows 7/Windows 10 Driver Setup



Before installing these drivers, you must ensure that the INF driver has been installed. See Chapter 4 for information on installing this driver.

4.3 LAN Configuration

4.3.1 Introduction

The VPS-3100 has a single Gigabit Ethernet I210-IT LAN connected to a dedicated PCIe x1 lane, offering bandwidth up to 500 Mbps, eliminating network dataflow bottlenecks, and incorporating Gigabit Ethernet at 1000 Mbps.

4.3.2 Features

- 10/100/1000Base-T Ethernet controller
- 10/100/1000Base-T triple-speed MAC
- Full-duplex at 10/100/1000 Mbps and half-duplex at 10/100 Mbps
- WoL support
- PCIe x1 host interface

4.3.3 Installation



Before installing the LAN drivers, you must ensure that CSI Utility has been installed on your system. See Chapter 4 for information on installing this utility.

The integrated Intel® gigabit Ethernet controller supports all major network OSs. However, the installation procedure varies between operating systems. Please refer to the following sections to find the driver setup procedure for your OS.

4.4 Intel® TXE (Trusted Execution Engine) Setup

4.4.1 Introduction

VPS-3100 provides TXE (Trusted Execution Engine) driver for installation.

4.5 Install USB3.0

4.5.1 Introduction

The VPS-3100 has four USB 3.0 ports. The data transfer rate of USB 3.0 (5 Gbps) is 10 times faster than that of USB 2.0 (480 Mbps).

4.6 CamNavi Driver Installation

4.6.1 Introduction

This section describes the driver installation and configuration procedures for Windows 7 and Windows 10 (both 32- and 64-bit).

4.6.2 Driver Setup

To utilize the advanced features of Windows 7 and Windows 10, such as multi-processing and multi-threading, 32-bit and 64-bit Windows device drivers are provided for the cards.

The following steps are for installing the Windows 32-bit/64-bit driver for the VPS-3100.

- 1. Visit the Advantech website, search for "PCIE-1172," click on the Manual/Driver/ BIOS/FAQ icon, and download the driver (this driver also supports the VPS-3100).
- 2. Unzip the driver, double-click on the EXE file and follow the prompts to complete the installation.

3. After the installation has been completed, the device will appear in Windows Device Manager.



Figure 4.1 CamNavi driver in Device Manager

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Digital I/O Setting

This chapter introduces how to operate the digital I/O.

5.1 I/O Control

5.1.1 Digital Input

Each port has one optically isolated digital input that can act as a start trigger for the camera. It also support debouncer and inverter features. The debouncer feature identifies valid/invalid input signals on the basis of the minimum period of time for the valid signal (i.e., the debouncer value). Thus, the circuit will respond only to those signals that have a pulse width greater than the debouncer value.



Figure 5.1 Isolated digital input response

5.1.2 Digital Output

Each camera port has two optically isolated digital outputs that support an inverter feature. The outputs can be configured to operate in three different modes: user-programmable mode, pass mode, and counter mode.

User-Programmable Mode:

This mode allows you to program the state of the digital output line.

Pass Mode:

In this mode, the digital output signal is active whenever a valid digital input signal is detected.

Counter Mode:

In this mode, the digital input signal acts as the trigger source. The falling or rising edge can be set as the trigger event for the digital output to generate a pulse. The delay time and pulse width are user-defined. The basic principle of counter mode is exemplified as follows, with a timing chart depicting how the rising edge acts as a trigger:

- 1. A rising edge is detected in the input signal.
- 2. When the delay time expires, the output signal switches to high.
- 3. When the signal period expires, the output signal switches to low.



Figure 5.2 Isolated digital output response

5.2 Camera Control

5.2.1 Acquisition Start and Stop

The camera control procedure requires the following major configuration:

Camera Acquisition Mode

Camera acquisition mode has two configurations: singe frame mode and continuous frame mode. In single frame mode, the camera will acquire a single frame and return each frame once for every acquisition start command that is executed. In continuous frame mode, the camera will perform acquisition continuously until a camera acquisition stop command is executed.

Camera Acquisition Start/Stop

When a camera acquisition start command is executed, the camera will acquire images and return them to the frame grabber. This will continue until a camera acquisition stop command has been executed.

Frame Grabber Acquisition Start/Stop

When a frame grabber acquisition start command is executed, the frame grabber will transfer all images from the camera to the system memory buffer. By contrast, when a frame grabber acquisition stop command is executed, frame grabber will stop transferring images and ignore all images from the camera.

The following example shows the camera control procedure for image acquisition

```
//Define the AcquisitionMode as "2" ("Continuos Acquisition Mode")
pAcquisitionMode->SetValue(2);
//Start the camera image acquisition function pAcquisitionStart-
>Execute();
//Start acquisition and grab 10 image frames pCamera->StartAcq(10);
```

5.2.1.1 Camera Configuration

There are two methods for configuring the camera:

- Using predefined camera parameters
 For predefined camera parameters, you can configure them using the CamNavi API.
- Using customized camera parameters For customized parameters, the CamNavi API requires the parameter name, which is defined in the camera profile (XML file).

The following example demonstrates the camera configuration process.

```
//Get the predefined image width
IIntNode *pWidth = pCamConfigure->GetWidth(); int64_t iValue =
pWidth->GetValue();
iValue = pWidth->GetMax(); iValue = pWidth->GetMin();
//Get the customized "TestImageSelector" control node from camera
profile
IEnumNode *pTestImage = pCamConfigure->GetEnumNode("TestImageSelec-
tor");
pTestImage->SetValue(1);
```

5.3 Image Acquisition

There are three ways to trigger a camera for image acquisition: software trigger, hardware trigger, and trigger-over-Ethernet (ToE). The following sections detail about how to use each acquisition method.

5.3.1 Software Trigger Mode

In software trigger mode, you can use the software API to control the image acquisition process, and the camera will not acquire frames unless a software acquisition command is executed. The operating procedure is as follows:

1. Set the camera to software trigger mode.

```
//Get the node of the trigger mode and set it to "ON"
//The node name and setting value depends on the camera type
IEnumNode *pTriggerMode = pCamConfigure->GetEnumNode("TriggerMode");
if (!pTriggerMode) { printf("ERROR: Invalid TriggerMode node!!");
return 0; }
pTriggerMode->SetValue(1);
```

```
//Get the node of the trigger source and set it to "Software"
//The node name and setting value depends on the camera type
IEnumNode *pTriggerSource = pCamConfigure->GetEnumNode("Trigger-
Source");
if (!pTriggerSource) { printf("ERROR: Invalid TriggerSource node
!!"); return 0; }
pTriggerSource->SetValue(0);
```

Cate	egory :	Visibility :
Aco	quisition Controls	• Beginner •
	Parameter	Value
1	Acquisition Mode	Continuous
2	Acquisition Start	EXE
3	Acquisition Stop	EXE
4	AcquisitionFrameCount	1
5	Trigger Selector	FrameStart 🔹
6	Trigger Mode	On 🗸
7	Generate Software Trigger	EXE
8	Trigger Source	Software 🗸
9	Trigger Activation	RisingEdge 🔹
10	Exposure Mode	Timed
11	Exposure Auto	Off
12	Exposure Time (Abs)	35000.00
13	Exposure Time (Raw)	35000
14	Enable Acquisition Frame Rate	
15	Acquisition Frame Rate (Abs)	10.00
16	Resulting Frame Rate (Abs)	14.59
17	Sync Free Run Enable	
18	Sync Free Run Start Time Low	0
19	Sync Free Run Start Time High	0
20	Sync Free Run Trigger Rate	10.00
21	Sync Free Run Undate	FXF

Figure 5.3 Configuring the camera in software trigger mode

2. Execute an image acquisition command via the API.

```
//Get the node of the software trigger function and execute the com-
mand
//The node name and setting value depend on the type of camera
IComdNode *pTriggerSoftware = pCamConfigure->GetComdNode("Trigger-
Software");
if (!pTriggerSoftware) { printf("ERROR: Invalid TriggerSoftware
node!!"); return 0; }
pTriggerSoftware->Execute();
```

Category : Visibility :		
Acquisition Controls		 Beginner
Darameter		Value
1	Acquisition Mode	Continuous
2	Acquisition Start	EXE
3	Acquisition Stop	EXE
4	AcquisitionFrameCount	1
5	Trigger Selector	FrameStart 💌
6	Trigger Mode	On 👻
7	Generate Software Trigger	EXE
8	Trigger Source	Software 👻
9	Trigger Activation	RisingEdge 👻
10	Exposure Mode	Timed 💌
11	Exposure Auto	Off 👻
12	Exposure Time (Abs)	35000.00
13	Exposure Time (Raw)	35000
14	Enable Acquisition Frame Rate	
15	Acquisition Frame Rate (Abs)	10.00
16	Resulting Frame Rate (Abs)	14.59
17	Sync Free Run Enable	
18	Sync Free Run Start Time Low	
19	Sync Free Run Start Time High	0
20	Sync Free Run Trigger Rate	10.00
21	Sync Free Run Update	EXE

Figure 5.4 Executing image acquisition

- 3. The camera will acquire the images after receiving an image acquisition command. The images will then be transmitted to the host PC.
- 4. The camera will return to standby mode and await the next acquisition command.

5.3.2 Hardware Trigger Mode

When in hardware trigger mode, the camera's digital input pin must be connected to an external trigger source (e.g., a proximity sensor). The camera will begin the image acquisition process and capture the first frame as soon as the digital input is active. The operating procedure is given as follows:

1. Set the camera to hardware trigger mode.

```
// Get the node of the trigger mode and set it on.
// The node name and setting value is dependent on camera.
IEnumNode *pTriggerMode = pCamConfigure->GetEnumNode("TriggerMode");
if (!pTriggerMode) { printf("ERROR: Invalid TriggerMode node!!");
return 0; }
pTriggerMode->SetValue(1);
```

2. Configure the digital input signal of the camera as the trigger source.

```
//Get the node of the trigger source and set it to Line1
//The node name and setting value is dependent on camera
IEnumNode *pTriggerSource = pCamConfigure->GetEnumNode("Trigger-
Source");
if (!pTriggerSource) { printf("ERROR: Invalid TriggerSource
node!!"); return 0; }
pTriggerSource->SetValue(1);
```

ategory :	Visibility :
Acquisition Controls	▼ Beginner ▼
Parameter	Value
1 Acquisition Mode	Continuous 👻
2 Acquisition Start	EXE
3 Acquisition Stop	EXE
4 AcquisitionFrameCount	
5 Trigger Selector	FrameStart 💌
6 Trigger Mode	On 👻
7 Generate Software Trigger	EXE
8 Trigger Source	Line1 🗸
9 Trigger Activation	RisingEdge 🗸
10 Exposure Mode	Timed 👻
11 Exposure Auto	Off 👻
12 Exposure Time (Abs)	35000.00
13 Exposure Time (Raw)	35000
14 Enable Acquisition Frame Ra	te 🗌
15 Acquisition Frame Rate (Abs)) 10.00
16 Resulting Frame Rate (Abs)	14.59
17 Sync Free Run Enable	
18 Sync Free Run Start Time Lov	v 0 🗘 🗁
19 Sync Free Run Start Time Hig	jh 0
20 Sync Free Run Trigger Rate	10.00
21 Sync Free Run Update	EXE

Figure 5.5 Configuring the camera in hardware trigger mode

- 3. Apply a pulse to the camera digital input channel.
- 4. The camera will acquire the images and then transmit them to the host PC.
- 5. The camera will return to standby mode and await the next valid trigger signal.

5.3.3 ToE

This feature is available only for Advantech industrial cameras. In ToE mode, the digital input pin of the VPS-3100 must be connected to an external trigger source (e.g., proximity sensor). The VPS-3100 will transmit an image acquisition command via Ethernet as soon as the unit's digital input is active. The camera will then begin exposing and reading out a frame only. Below is the operation procedure:

1. Set the camera to software trigger mode.

```
//Get the node of the trigger mode and set it on.
//The node name and setting value is dependent on camera.
IEnumNode *pTriggerMode = pCamConfigure->GetEnumNode("TriggerMode");
if (!pTriggerMode) { printf("ERROR: Invalid TriggerMode node!!");
return 0; }
pTriggerMode->SetValue(1);
```

```
//Get the node of the trigger source and set it to Action1.
//The node name and setting value is dependent on camera.
IEnumNode *pTriggerSource = pCamConfigure->GetEnumNode("Trigger-
Source");
if (!pTriggerSource) { printf("ERROR: Invalid TriggerSource
node!!"); return 0; }
pTriggerSource->SetValue(21);
```

Category :		Visibility :	
-	 Darameter	Value	
1	Acquisition Mode	Continuous	
2	Acquisition Start	EXE	
3	Acquisition Stop	EXE	
4	AcquisitionFrameCount		
5	Trigger Selector	FrameStart V	
-	Trigger Mode	On 🗸	
7	Generate Software Trigger	EXE	
8	Trigger Source	Action1 -	
9	Trigger Activation	RisingEdge 🔹	
10	Exposure Mode	Timed	
11	Exposure Auto	Off 👻	
12	Exposure Time (Abs)	35000.00	
13	Exposure Time (Raw)	35000	
14	Enable Acquisition Frame Rate		
15	Acquisition Frame Rate (Abs)	10.00	
16	Resulting Frame Rate (Abs)	14.59	
17	Sync Free Run Enable		
18	Sync Free Run Start Time Low	0	
19	Sync Free Run Start Time High	0	
20	Sync Free Run Trigger Rate	10.00	
21	Sync Free Run Update	EXE	

Figure 5.6 Configuring the camera in ToE mode

2. Enable the digital input interrupt of the card.

```
// Get the node of the DI Interrupt and enable it.
IEnumNode *pDI_int = pCardConfigure->GetEnumNode("DI_Interrupt_01");
if (!pDI_int) { printf("ERROR: Invalid DI Interrupt node!!"); return
0; }
pDI int ->SetValue(1);
```

3. Apply a digital output pulse to the PCIE-1172/PCIE-1174 digital input pin.

```
// Get the node of the DI TOE Trigger Edge and set it.
IEnumNode *pDI_PoETriggerEdge = pCardConfigure->GetEnum-
Node("DI_ToeTriggerEdge_01");
if (!pDI_PoeTriggerEdge) { printf("ERROR: Invalid DI Interrupt
node!!"); return 0; }
pDI_PoeTriggerEdge ->SetValue(1);// Disable : 0, Rising_Edge : 1,
Falling Edge : 2, Both Edge : 3
```

Adv_GigE_Vision_040100_01		×
Category :	Visibility :	
Digital Input 01	▼ Beginner	•
Parameter	Value	
1 DI Interrupt	Enable_Interrupt	•
2 DI Invert	Disable_Invert	
3 DI Interrupt Trigger Edge	Disable	•
4 DI TOE Trigger Edge	Rising_Edge	•
5 DI Debouncer	0	
6 Digital Input		

- 4. Apply a digital output pulse to the VPS-3100 digital input pin.
- 5. The camera will acquire one image and send the image data to the host PC as soon as it receives an acquisition command from the VPS-3100.
- 6. The camera will return to standby mode and await the next acquisition command.

5.4 Lighting Control

Two PWM lighting controllers are embedded in the VPS-3100. You can specify the frequency, intensity, and lighting mode to suit different application conditions.

5.4.1 Light Intensity and Frequency

Each PWM output consists of two 8-bit counters with a 20-MHz clock base. You can appoint high-period and low-period counts to compose a PWM waveform with various intensities and frequencies.

 $Count_{High-period} = X, Count_{Low-period} = Y, X, Y = 0 \sim 255$

Then we get, Intensity $= \frac{X}{X+Y}$,

Frequency = $\frac{1}{(X+Y) * 50ns} Hz$

Here is an example, $Count_{High-period} = 150, Count_{Low-period} = 50$

Intensity = 75%

Frequency = $\frac{1}{(150 + 50) * 50 * 10^{-9}} = 100 \text{K Hz}$

A coding example is given below:

```
Array<PoChannel>*poChannel = NULL;
poChannel = pwModulatorCtrl->getChannels();
// Set PWM High/Low period
poChannel->getItem(0).setPulseWidth({ PWM_HiPeriod, PWM_LoPeriod });
```





5.4.2 Strobe Mode

Before setting the controller to strobe mode, you first need to set the luminescence time and delay time. Then, you can trigger the output via an external isolated digital input or an internal software trigger. The LED will be illuminated according to the time interval settings, as shown below:



Figure 5.8 Strobe mode

The VPS-3100 uses a one-shot output counter for the delay time setting. A coding example is given below:



Following is a coding example for setting the luminescence time and enabling PWM output:

```
// FWM luminescence time setting
uint32 FWM_LatencyCount = (uint32) (FWM_Latency / FWM_Period + 0.5);
poChannel->getItem(0).setOutCount(FWM_LatencyCount);
// Set Strobe mode
void* hdevice;
hdevice = pwModulatorCtrl->getModule();
uint32 value[1];
memset(value, 0, sizeof(value));
value[0] = SigCntOut0;
AdxPropertyWrite(hdevice, CFG_ChipGateSourceOfCounters, sizeof(value), value, 0);
// ARM FWM Out
pwModulatorCtrl->setEnabled(true);
```

5.4.3 On/Off Mode

In on/off mode, the output will synchronize to the external isolated digital input level, as shown in the following figure:



Figure 5.9 Strobe mode

Following is an example code for enabling on/off mode:

```
// Set On/off mode
void* hdevice;
hdevice = pwModulatorCtrl->getModule();
uint32 value[1];
memset(value, 0, sizeof(value));
value[0] = SigDi0;
AdxPropertyWrite(hdevice, CFG_ChipGateSourceOfCounters, sizeof(value), value, 0);
// ARM PWM Out
pwModulatorCtrl->setEnabled(true);
```

5.4.4 Lighting Control PWM Output Specifications

Table 5.1: PWM Out	tput Specifications
Drive method	Constant voltage
Lighting method	Strobe mode, on/off mode
Intensity control method	PWM control
Channel number	2
Applicable Light Unit (rated)	24 V, 10 W
PWM Frequency	up to 200 KHz with 100 steps
PWM Scaling Resolu- tion	8-bit (50 ns/step)
PWM High Period	50 ns ~ [(28-1) x 50] ns
PWM Low Period	50 ns ~ [(28-1) x 50] ns
Output Voltage	24V _{DC} +/-10%
Output Current	500 mA max. per channel
Output Delay time	0 ~ 1 s
Output Light time	Max. 0.32768 s with 200-KHz output
Counter Base Clock	20 MHz
Input overcurrent pro- tection	Fuse cuts off when an overcurrent is detected

VPS-3100 User Manual


Programming the Watchdog Timer

A.1 Programming the Watchdog Timer

The VPS-3100's watchdog timer can be used to monitor system software operation and take corrective action in the event of software failure. This section describes how to operate and program the watchdog timer.

A.1.1 Watchdog Timer Overview

A watchdog timer is built into the NCT6106D I/O controller. It provides the following user-programmable functions:

- It can be enabled/disabled by user program
- It can be set from 1 to 255 s or 1 to 255 min
- In the event of software failure, it generates an interrupt or reset signal to reset the timer before a time-out occurs

A.1.2 Programming the Watchdog Timer

The I/O port address (hex) of the watchdog timer is 2E (address port) and 2F (data port). You must first assign the register address by entering the corresponding value for the address port. Then, you can write/read data to/from the assigned register via the data port.



Table A.1:	Watchdo	og timer registers
Register Address* (2E)	Read/ Write	Value (2F) and description
87	-	Enter this address to the I/O address port (2E) twice to unlock the NCT6106D
07	W	Enter "08" to select the watchdog timer register
30	W	Enter "01" to enable the watchdog timer function (this is disabled by default)
F0	W	Sets the unit of time to seconds or minutes. Enter "0 to bit 3" for seconds (default) or "1 to bit 3" for minutes.
F1	W	Enter "0" to stop the timer (default setting) Enter "01~FF" as the count amount (whether this is seconds or min- utes will depend on the value entered in register F5). This value determines how long the watchdog timer will wait before generating an interrupt or reset signal for the strobe. Writing a new value to this register will reset the timer to count with the new value.
F2	R/W	Bit 7: Enter "1" to enable the mouse to reset the timer, or enter "0" to disable this option (default = 0). Bit 6: Enter "1" to enable the keyboard to reset the timer, or enter "0" to disable this option (default = 0). Bit 5: Enter "1" to generate a time-out signal immediately and auto- matically return to "0" (default = 0). Bit 4: Read the status of the watchdog timer ("1" = the timer has timed out).
AA	-	Write this address to I/O port 2E to lock the second watchdog timer.

*All register addresses are expressed in hex.

Appendix A Programming the Watchdog Time

A.1.3 Example Program

1. Enable the watchdog timer and set the time-out interval to 10 s

;-----

Mov dx,2eh ; Unlock the NCT6106D Mov al,87h Out dx,al Out dx,al

;-----

Mov al,07h ; Select the registers of watchdog timer Out dx,al Inc dx

Mov al,08h Out dx,al

;-----

Dec dx ; Enable the function of watchdog timer Mov al,30h Out dx,al Inc dx

Mov al,01h Out dx,al

;-----

Dec dx ; Set seconds as the unit of time Mov al,0f0h

Out dx,al Inc dx

In al,dx

And al,not 08h Out dx,al

;-----

Dec dx ; Set the time-out interval to 10 and start counting Mov al,0f1h Out dx,al Inc dx Mov al,10 Out dx,al

;-----

Dec dx ; Lock NCT6106D Mov al,0aah

Out dx,al

2. Enable the watchdog timer and set the time-out interval to 5 min

;-----

Mov dx,2eh ; Unlock NCT6106D Mov al,87h Out dx,al Out dx,al

Mov al,07h ; Select the registers of watchdog timer Out dx,al Inc dx

Mov al,08h Out dx,al

;-----

Dec dx ; Enable the function of the watchdog timer Mov al,30h Out dx,al Inc dx Mov al,01h Out dx,al

:-----

Dec dx ; Set minutes as the unit of time Mov al,0f0h Out dx,al Inc dx In al,dx Or al,08h Out dx,al

:-----

Dec dx ; Set the time-out interval to 5 min and start counting Mov al,0f1h Out dx,al Inc dx Mov al,5 Out dx,al

Dec dx ; Lock the NCT6106D Mov al,0aah

Out dx,al

3. Enable the watchdog timer to be reset by mouse

;-----

Mov dx,2eh ; Unlock the NCT6106D Mov al,87h Out dx,al Out dx,al

·_____

Mov al,07h ; Select the registers of the watchdog timer Out dx,al Inc dx Mov al,08h Out dx,al

······

Dec dx ; Enable the function of the watchdog timer Mov al,30h Out dx,al Inc dx Mov al,01h Out dx,al ;------

Dec dx ; Enable the watchdog timer to be reset by the mouse Mov al,0f2h Out dx,al Inc dx

In al,dx Or al,80h Out dx,al

;-----

Dec dx ; Lock NCT6106D Mov al,0aah

Out dx,al

4. Enable the watchdog timer to be reset by the keyboard

;-----

Mov dx,2eh ; Unlock NCT6106D Mov al,87h Out dx,al Out dx,al

:-----

Mov al,07h ; Select the registers of the watchdog timer Out dx,al lnc dx $% \left(x,y\right) =\left(x,y\right) =\left(x,y\right) +\left(x,y\right)$

Mov al,08h Out dx,al

;-----

Dec dx ; Enable the function of the watchdog timer Mov al,30h Out dx,al Inc dx Mov al,01h Out dx,al

;-----

Dec dx ; Enable the watchdog timer to be reset by the keyboard Mov al,0f2h Out dx,al Inc dx In al,dx Or al,40h Out dx,al

Dec dx ; Lock NCT6106D Mov al,0aah Out dx,al

5. Generate a time-out signal without the timer counting

Appendix A Programming the Watchdog Time

;-----

Mov dx,2eh ; Unlock NCT6106D Mov al,87h Out dx,al Out dx,al

;-----

Mov al,07h ; Select the registers of the watchdog timer Out dx,al Inc dx Mov al,08h Out dx,al

:-----

Dec dx ; Enable the function of the watchdog timer Mov al,30h Out dx,al Inc dx Mov al,01h Out dx,al

;-----

Dec dx ; Generate a time-out signal Mov al,0f2h Out dx,al ;Write 1 to bit 5 of F7 register Inc dx In al,dx Or al,20h Out dx,al

·_____

Dec dx ; Lock NCT6106D Mov al,0aah Out dx,al



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