User Manual

VDX3-6755

with

DM&P Vortex86DX3
1GHz processor

Version 5.0

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Revision History

Revision	Date	Remark
1.0	April 1st, 2016	First version release
2.0	June 15th, 2016	Error Correction for LVDS pin assignment
3.0	August 24th, 2016	Error Correction for BIOS Setting
4.0	September 26th, 2016	New Add: Dual Core Part Number
5.0	June 8th, 2017	New Add: Working temperature for Dual Core version

Table of Contents

1 General Information

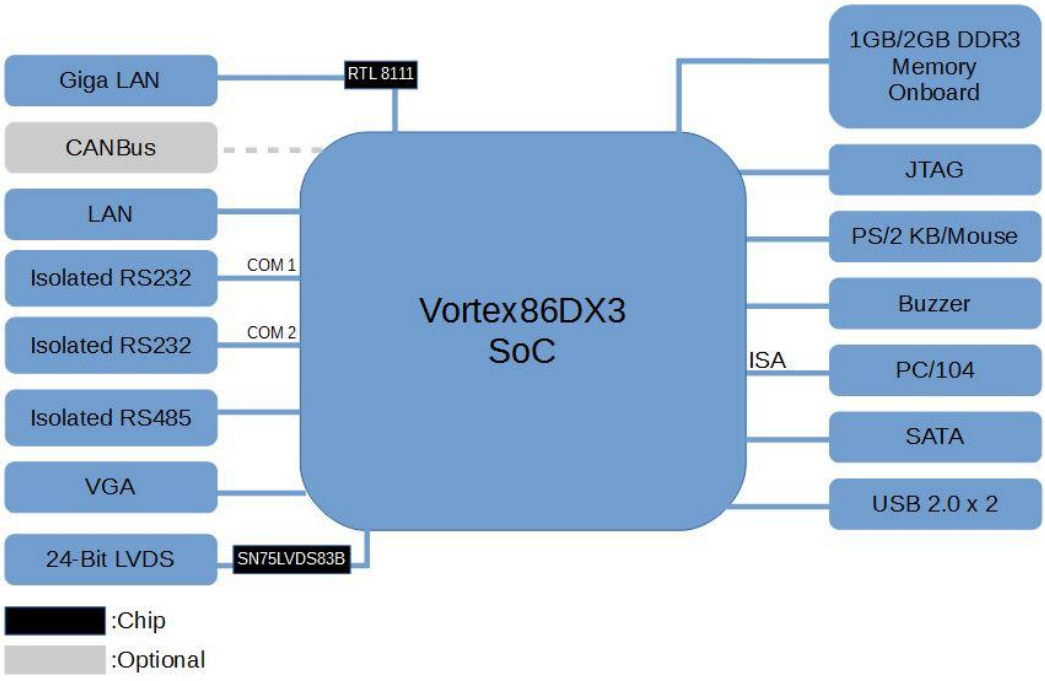
1.1 Overview

The VDX3-6755 PC/104 family of low-power x86 embedded controller is designed to meet PC/104 specification with backward compatibility to provide migration path for projects facing end-of-life challenges with their existing x86 based PC/104 controller.

In addition, the VDX3-6755 family of controller is designed as a plug in replacement, with backward compatibility to support legacy software to help extend existing product life cycle without heavy re-engineering.

The VDX3-6755 is suitable for broad range of data-acquisition, industrial automation, process control, automotive controller, AVL, intelligent vehicle management device, medical device, human machine interface, robotics, machinery control and more

1.2 Block diagram



1.3 Specifications

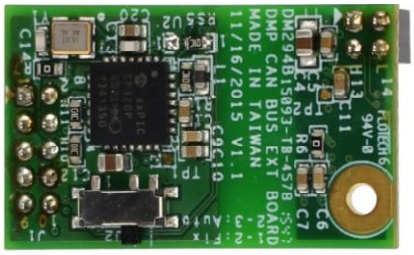
Processor	DM&P SoC CPU Vortex86DX3 - 1GHz Real Time Clock with Lithium Battery Backup
Cache	L1:32K I-Cache, 32K D-Cache, L2 Cache:512KB
Bus	PC/104 Standard Compliant
System Memory	1GB/2GB DDR3 Onboard
Watchdog Timer	Software programmable from 30.5us to 512 seconds x2 sets (Watchdog 1 fully compatible with M6117D)
VGA	Integrated 2D VGA chip with dual display support (VGA + LVDS) VGA: Maximum resolution up to 1920x1080 @ 60Hz LVDS: Maximum resolution up to 1024x768 @ 60Hz Single channel 24-bit LVDS
LAN	Integrated 10/100Mbps Ethernet Realtek 8111F 10/100/1000Mbps Ethernet
I/O Interface	SATA 7P Connector x1 Isolated RS-232 port x2 Isolated RS-485 port x1 CAN bus port x1 (Need additional COM to CAN bus module) USB port (Ver. 2.0) x2 10/100Mbps Ethernet port x1 10/100/1000Mbps Ethernet port x1

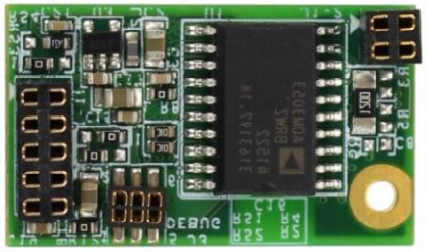
Connectors	SATA 7P for SATA x1 2.0mm 20-pin header for LVDS x1 2.0mm 10-pin box header for USB x1 2.0mm 10-pin box header for RS232 x2 2.0mm 10-pin box header for VGA x1 2.0mm 10-pin header for COM to CAN bus module x1 2.0mm 12-pin header for GbE x1 2.0mm 8-pin header for Ethernet x1 2.0mm 4-pin header for COM to CAN bus module x1 2.54mm 5-pin box header for Keyboard x1 2.54mm 5-pin header for Mouse x1 2.54mm 4-pin header for -5V, -12V, +12V, GND x1 2.54mm 3-pin header for RS485 x1 2.54mm 3-pin header for CAN bus x1 (Need additional COM to CAN bus module) 2.54mm 2-pin header for Reset x1
Power Requirement	Single Voltage +5V @1.15A (Typical)
Weight	80g
Dimensions	90mm x 96mm (3.54 x 3.77 inches)
Operating Temp.	-20℃ ~ +70℃ (Single Core) -10℃ ~ +60℃ (Dual Core) -40℃ ~ +85℃ (Optional for Single Core) -20℃ ~ +70℃ (Optional for Dual Core)
Operating System Support	Free DOS, DOS 6.22, PCDOS 7.1, DR-DOS, x-DOS, OS/2, Windows 7, Windows Embedded Standard 7, Windows Embedded Compact 7, Windows Embedded Compact 6, Windows XP Professional, Windows Embedded Standard(XPE), POS Ready(WePOS), Embedded Linux, QNX, Vxworks and FreeBSD.

1.4 Ordering Information

1.4.1 VDX3-6755

Product Name	1GB DDR3 onboard	2GB DDR3 onboard	Dual Core Processor
VDX3-6755-1G	V		
VDX3-6755-2C-1G	V		V
VDX3-6755-2G		V	
VDX3-6755-2C-2G		V	V
SERIALCAN			
CABLE-SET-6755			





SERIALCAN

1.4.2 Cable Set

Product Name	Contents	
CABLE-SET-6755	NET4X2(2.0)-LED x1	VGA(2.0) x1
	NET6X2(2.0)-LED x1	PS2KB x1
	RS232(2.0) x2	PS2KB(TEST) x1
	USB(2.0) x1	

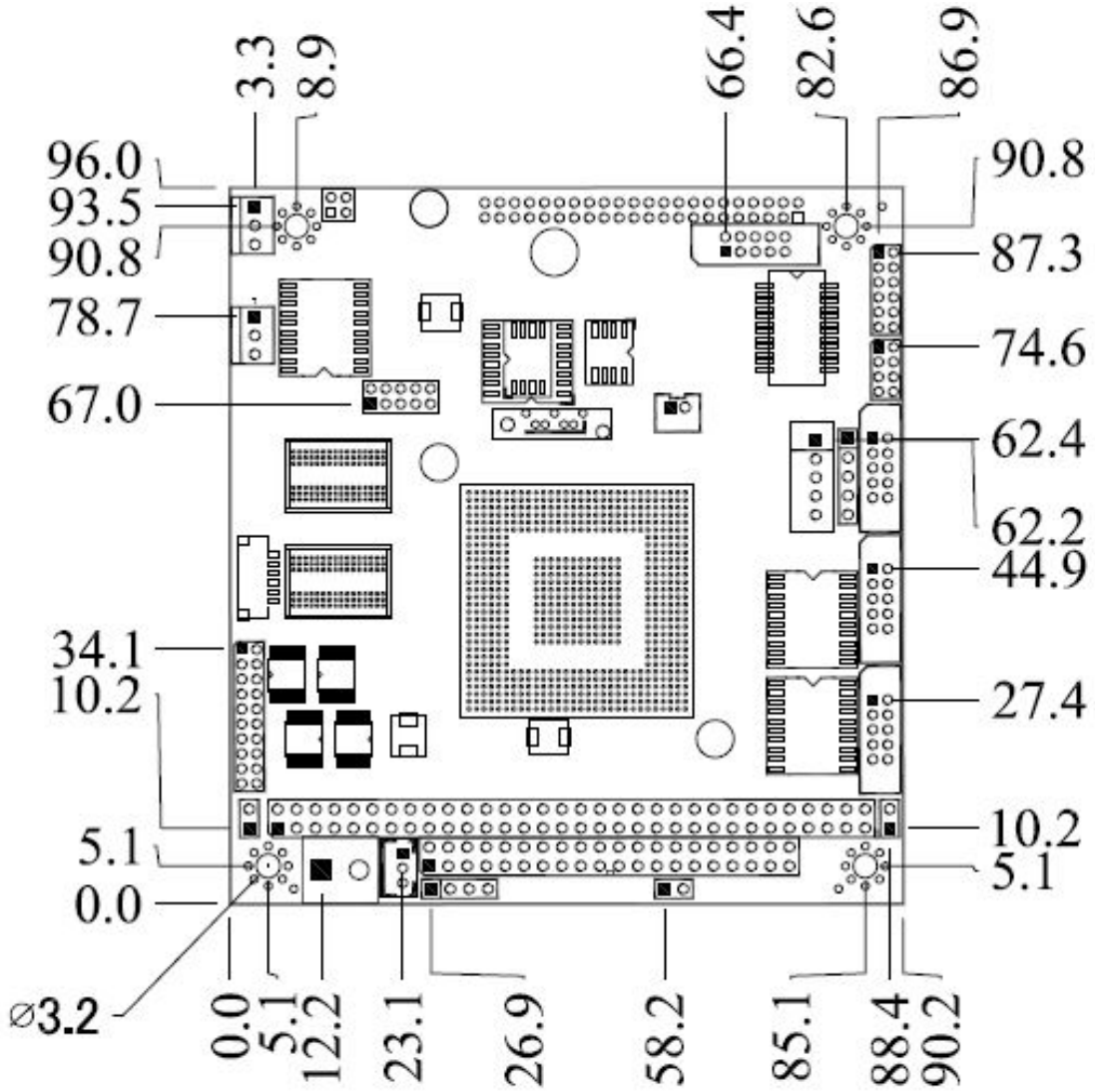
1.4.3 SATA DOM

Product Name	MLC	SLC	0℃ ~ +70℃	-40℃ ~ +85℃
SDM-SST-2G-H-M	V		V	
SDM-SST-4G-H-M	V		V	
ISATA-8G-H-M	V		V	
ISATA-16G-H-M	V		V	
ISATA-32G-H-M	V		V	
ISATA-4G-H-M-X	V			V
ISATA-8G-H-M-X	V			V
ISATA-16G-H-M-X	V			V
ISATA-32G-H-M-X	V			V
ISATA-1G-H-S		V	V	
ISATA-2G-H-S		V	V	
ISATA-4G-H-S		V	V	
ISATA-8G-H-S		V	V	
ISATA-16G-H-S		V	V	
SDM-SST-2G-H-S-X		V		V
SDM-SST-4G-H-S-X		V		V
SDM-SST-8G-H-S-X		V		V
ISATA-16G-H-S-X		V		V

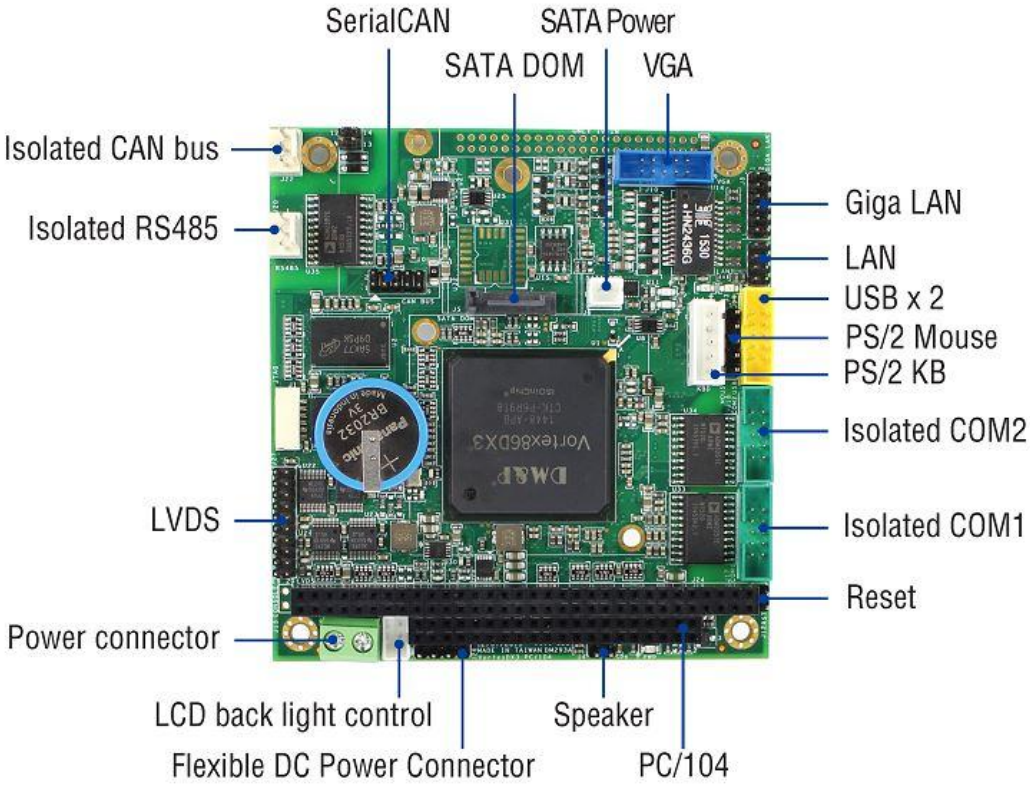
Demonstration of "SDM-SST" SATA DoM on VDX3-6755

2 Hardware Information

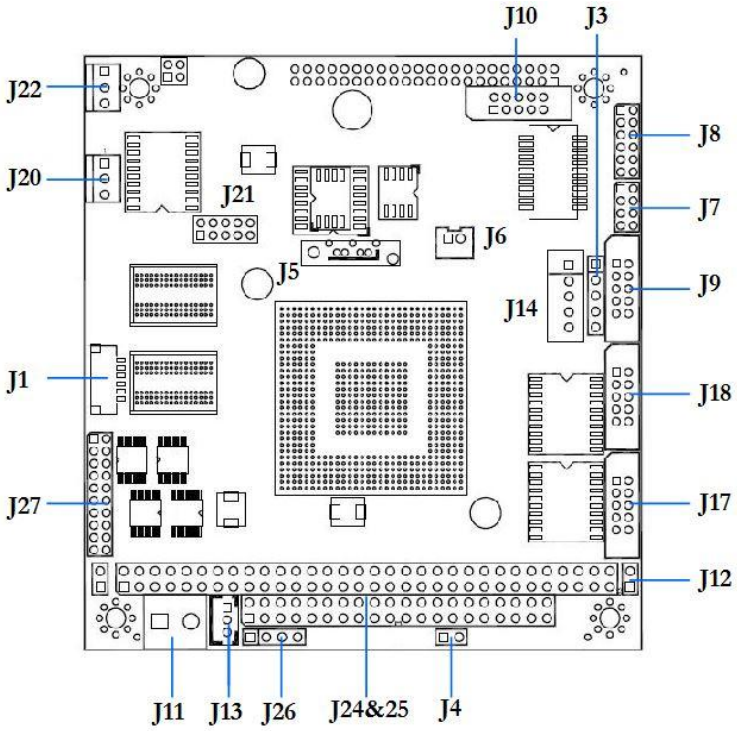
2.1 Dimension



2.2 Board Outline



2.3 Connector Location



2.4 Connector and Jumper Summary

Nbr.	Name	Type of Connections	Nbr of Pins
J1	JTAG	Wafer, 1.25mm, 1x6	6
J3	PS/2 Mouse	Box Header, 2.54mm, 1x5	5
J4	Buzzer	Pin Header, 2.54mm, 1x2	2
J5	SATA	SATA 7P Connector, 7x1	7
J6	SATA DOM Power	Box Header, 2.0mm, 1x2	2
J7	LAN	Pin Header, 2.0mm, 4x2	8
J8	Giga LAN	Pin Header, 2.0mm, 6x2	12
J9	USB	Pin Header, 2.54mm, 5x2	10
J10	VGA	Pin Header, 2.0mm, 5x2	10
J11	Power Connector	Terminal Block, 5.0mm, 2x1	2
J12	Reset	Pin Header, 2.54mm, 1x2	2
J13	LCD Control Port	Pin Header, 2.0mm, 1x3	3
J14	PS/2 Keyboard	Box Header, 2.54mm, 1x5	5
J15	Console Redirection	Pin Header, 2.0mm, 1x2	2
J17	COM1 (Isolate RS232)	Box Header, 2.0mm, 5x2	10
J18	COM2 (Isolate RS232)	Box Header, 2.0mm, 5x2	10
J20	Isolate RS485	Box Header, 2.54mm, 1x3	3
J21	TTL COM4 (for CAN bus module only)	Pin Header, 2.0mm, 5x2	10
J22	CAN bus	Box Header, 2.54mm, 1x3	3
J24	PC/104 Connector - 64 pins	Box Header, 2.54mm, 32x2	64
J25	PC/104 Connector - 40 pins	Box Header, 2.54mm, 20x2	40
J26	4P Power Source (Interconnect to PC/104 J24)	Pin Header, 2.54mm, 4x1	4
J27	LVDS	Pin Header, 2.0mm, 10x2	20
J28	TV-In (Optional)	Box Header, 2.0mm, 12x2	24
PWR LED	Power Active LED (Red)	SMD LED	
LED3	Link LED (Yellow)	SMD LED	
LED4	Duplex LED (Green)	SMD LED	

2.5 Pin Assignments & Jumper Settings

J1: JTAG

For JTAG use only

J3: PS/2 Mouse

Pin#	Single Name	Pin #	Single Name
1.	MSCLK	2	MSDATA
3	NC	4	GND
5	VCC		

J4: Buzzer

Pin#	Single Name	Pin #	Single Name
1.	Buzzer	2	VCC

J5: SATA DOM

Pin#	Single Name	Pin #	Single Name
1.	GND	2	TX+
3	TX-	4	GND
5	RX-	6	RX+
7	GND		

* The pin 7 support +5V (Optional)

J6: SATA DOM Power

Pin#	Single Name	Pin #	Single Name
1.	VCC	2	GND

J7: LAN

Pin#	Single Name	Pin #	Single Name
1.	LTX+	2	LTX-
3	LRX+	4	DUPLEX
5	LED0+	6	LRX-
7	LED1+	8	LINK/ACTIVE

J8: Giga LAN

Pin#	Single Name	Pin #	Single Name
1.	GTX+1	2	GTX-1
3	GRX+1	4	GTXC+1
5	GTXC-1	6	GRX-1
7	GRXD+1	8	GRXD-1
9	LED0+1	10	LED01
11	LED1+1	12	LED1/EESK1

J9: USB 0&1

Pin#	Single Name	Pin #	Single Name
1.	VCC	2	VCC
3	LUSBD1-	4	LUSBD0-
5	LUSBD1+	6	LUSBD0+
7	GND	8	GND
9	FGND	10	FGND

J10: VGA

Pin#	Single Name	Pin #	Single Name
1.	ROUT	2	GND
3	GOUT	4	GND
5	BOUT	6	GND
7	HSYNC	8	GND
9	VSYNC	10	GND

J11: Power Connector

Pin#	Single Name
1	+5V
2	GND

J12: Reset

Pin#	Single Name	Pin #	Single Name
1.	RST_SW	2	GND

J13: LCD Control Port

Pin#	Single Name
1	GND
2	Backlight Control Enabled
3	Backlight Control PWM

J14: PS/2 Keyboard

Pin#	Single Name	Pin #	Single Name
1.	KBCLK	2	KBDATA
3	NC	4	GND
5	VCC		

J15: Console Redirection

Pin#	Single Name	Pin #	Single Name
1.	ENABLE	2	GND

J17: COM1 (Isolated RS232)

Pin#	Single Name	Pin #	Single Name
1.	NC	2	RXD1
3	TXD1	4	NC
5	GND-ISO-COM1	6	NC
7	NC	8	NC
9	NC	10	NC

J18: COM2 (Isolated RS232)

Pin#	Single Name	Pin #	Single Name
1.	NC	2	RXD3
3	TXD3	4	NC
5	GND-ISO-COM3	6	NC
7	NC	8	NC
9	NC	10	NC

J20: Isolated RS485

Pin#	Single Name	Pin #	Single Name
1.	2RS485+	2	2RS485-
3	GND		

J21: TTL COM4 (for SERIALCAN only)

Pin#	Single Name	Pin #	Single Name
1.	DCD4	2	RXD4
3	TXD4	4	DTR4
5	GND	6	DSR4
7	RTS4	8	CTS4
9	RI4	10	VCC

J22: CAN Bus

Pin#	Single Name	Pin #	Single Name
1.	CANH	2	CANL
3	GND		

J24: PC/104 Connector – 64 pin

Pin#	Single Name	Pin #	Single Name
1.	IOCHCHK*	2	GND
3	SD7	4	RESETDRV
5	SD6	6	VCC
7	SD5	8	IRQ9
9	SD4	10	-5V
11	SD3	12	RDQ2
13	SD2	14	-12V
15	SD1	16	OWS
17	SD0	18	+12V
19	IOCHRDY	20	GND
21	AEN	22	SMEMW*
23	SA19	24	SMEMR*
25	SA18	26	IOW*
27	SA17	28	IOR*
29	SA16	30	DACK3*
31	SA15	32	DRQ3
33	SA14	34	DACK1*
35	SA13	36	DRQ1*
37	SA12	38	REFRESH*
39	SA11	40	SYSCLK
41	SA10	42	IRQ7
43	SA9	44	IRQ6
45	SA8	46	IRQ5
47	SA7	48	IRQ4
49	SA6	50	IRQ3
51	SA5	52	DACK2*
53	SA4	54	TC
55	SA3	56	BALE
57	SA2	58	VCC
59	SA1	60	OSC
61	SA0	62	GND
63	GND	64	GND

J25: PC/104 Connector – 40 pin

Pin#	Single Name	Pin #	Single Name
1.	GND	2	GND
3	MEMCS16*	4	SBHE*
5	IOCS16*	6	SA23
7	IRQ10	8	SA22
9	IRQ11	10	SA21
11	IRQ12	12	SA20
13	IRQ15	14	SA19
15	IRQ14	16	SA18
17	DACK0*	18	SA17
19	DRQ0	20	MEMR*
21	DACK5*	22	MEMW*
23	DRQ5	24	SD8
25	DACK6*	26	SD9
27	DRQ6	28	SD10
29	DACK7	30	SD11
31	DRQ7	32	SD12
33	VCC	34	SD13
35	MASTER*	36	SD14
37	GND	38	SD15
39	GND	40	NC

J26: 4P Power Source (Interconnect to PC/104 J24)

Pin#	Single Name
1.	-5V
2	-12V
3	+12V
4	GND

J27: LVDS

Pin#	Pin Name	in#	Pin Name
1	VCC3 (+3.3V)	2	VCC3 (+3.3V)
3	GND	4	GND
5	Y0P	6	Y0M
7	Y1M	8	GND
9	GND	10	Y1P
11	Y2P	12	Y2M
13	CLKOUTM	14	GND
15	GND	16	CLKOUTP
17	Y3M	18	GND
19	GND	20	Y3P

System Mapping

Memory Mapping		
Address	**Description**	**Usage**
00000000 – 0009FFFF	System RAM	*
000A0000 – 000AFFFF	EGA/VGA Video Memory	*
000B0000 – 000B7FFF	MDA RAM, Hercules graphics display RAM	*
000B8000 – 000BFFFF	CGA display RAM	*
000C0000 – 000C7FFF	EGA/VGA BIOS ROM	*
000C8000 – 000CFFFF	Boot ROM enable	
000CC000 – 000CFFFF	Console Redirection enable	
000D0000 – 000D7FFF	Expansion ROM space	
000D8000 – 000D8FFF	SPI Flash Emulation Floppy A Enable	
000DC000 – 000DFFFF	Expansion ROM Space	
000E0000 – 000EFFFF	USB Legacy SCSI ROM space	
000F0000 – 000FFFFF	Motherboard BBIOS	*
FEFDBC00 – FEFDBCFF	Standard OpenHCD USB Host Controller	*
FEFBB400 – FEFBB4FF	Onboard Ethernet Adapter	*
FEFDB800 – FEFDBFFF	Standard Enhanced PCI to USB Host Controller	*

I/O Mapping		
Address	**Description**	**Usage**
0000h – 000Fh	DMA 8237-1	*
0020h – 0021h	PIC 8259-1	*
0022h – 0023h	Indirect Access Registers (6117D configuration port)	*
0040h –0043h	Timer Counter 8254	*
0060h	Keyboard / Mouse data port	
0061h	Port B + NMI control port	*
0062h – 0063h	8051 download 4k address counter	
0064h	Keyboard/ Mouse status/ command port	
0065h	WatchDog0 reload counter	
0070h – 0071h	CMOS RAM port	*
0072h – 0075h	MTBF control register	*
0078h – 007Ch	GPIO port 0,1,2,3,4 default setup	*
0080h – 008Fh	DMA page register	
0092h	System control register	*
0093h – 0097h	GPIO port 6,7,8,9,A direction control	*
0098h – 009Dh	GPIO port 0,1,2,3,4,5 direction control	*
00A0h – 00A1h	PIC 8259-2	*
00A8h – 00ADh	WatchDog1 control counter	*
00AEh	WatchDog1 reload counter	*
00C0h – 00DFh	DMA 8237-2	*
00E0h – 00EFh	DOS 4G Page access	*
0100h – 0105h	GPIO port 5,6,7,8,9,A default setup	*
0170h – 0177h	IDE 1(IRQ 15)	*
0278h – 027Fh	Printer port (IRQ7, DMA 0)	*
02E8h – 02EFh	COM4 (IRQ 11)	*
02F8h – 02EFh	COM2 (IRQ 3)	*
03E8h – 03EFh	COM3 (IRQ 10)	*
03F6h	IDE1 ATAPI device control write only register	*
03F8h – 03FFh	COM1 (IRQ 4)	*
0480h – 048Fh	DMA High page register	*
0490h – 0499h	Instruction counter register	*
04D0h – 04D1h	8259 Edge / level control register	*
0CF8h – 0CFFh	PCI configuration port	*
DE00h – DEFFh	On board LAN	*
FC00h – FC05h	SPI Flash BIOS control register	*

FC08h – FC0Dh	External SPI BUS control register	*

IRQ Mapping		
Address	**Description**	**Usage**
IRQ0	System Timer	*
IRQ1	Keyboard Controller	*
IRQ2	Cascade for IRQ8~15	
IRQ3	Serial port 2	*
IRQ4	Serial port 1	*
IRQ5	USB	*
IRQ6	USB	
IRQ7	Printer Port	*
IRQ8	Real Timer Clock	*
IRQ9	ACPI	*
IRQ10	Serial Port 3	*
IRQ11	Serial Port 4	*
IRQ12	Mouse	*
IRQ13	Math Coprocessor	*
IRQ14	Multimedia Device	*
IRQ15	Hard Disk Controller #2	*

DMA Mapping		
Address	**Description**	**Usage**
DMA0		
DMA1		
DMA2		
DMA3		
DMA4		
DMA5		
DMA6		
DMA7		

3 Software Resources

3.1 ICOP Technical Resource Website

In the following website, you will find our latest user manuals, including OS support resources systems such as evaluation images for Windows Embedded Compact 7, Windows Embedded CE 6.0, Windows Embedded CE 5.0, and Windows XP Embedded (Win XPe). For details, please kindly visit the following link: http://tech.icop.com.tw/

4 Technical support

4.1 Display Introduction

The VDX3-6755 offers two different interfaces which support maximum resolution up to 1920 x 1080 (@ 60MHz) connecting to VGA and 24-bit LVDS LCD Flat Panel.

4.2 Pin Assignment of 24-bit LVDS

LVDS Pin Assignment

LVDS Pin#	Pin Name	LVDS Pin#	Pin Name
1	VCC3 (+3.3V)	2	VCC3 (+3.3V)
3	GND	4	GND
5	Y0P	6	Y0M
7	Y1M	8	GND
9	GND	10	Y1P
11	Y2P	12	Y2M
13	CLKOUTM	14	GND
15	GND	16	CLKOUTP
17	Y3M	18	GND
19	GND	20	Y3P

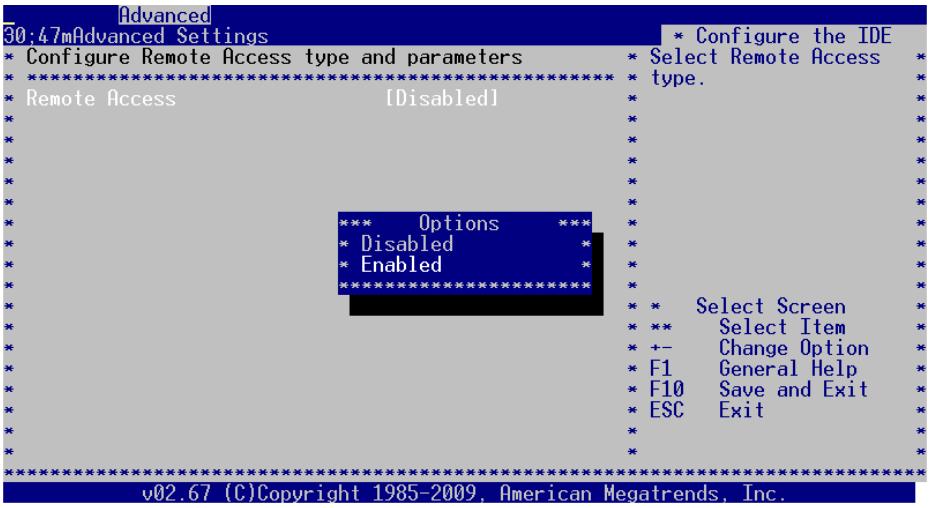
4.3 BIOS Introduction

Featuring AMI BIOS, the VDX3-6755 module is a one stable module board for your applications. In this section, we will introduce you some basic AMI BIOS setting such as CPU speed adjusting, console redirection, and IDE configuration, etc.

4.3.1 Console Direction

Access to computer board through serial port, you can work on VDX3-6755 without VGA display or monitor. The default access port is COM1 and disabled. If you would like to use this function, please go to the path below to enable Console Redirection.

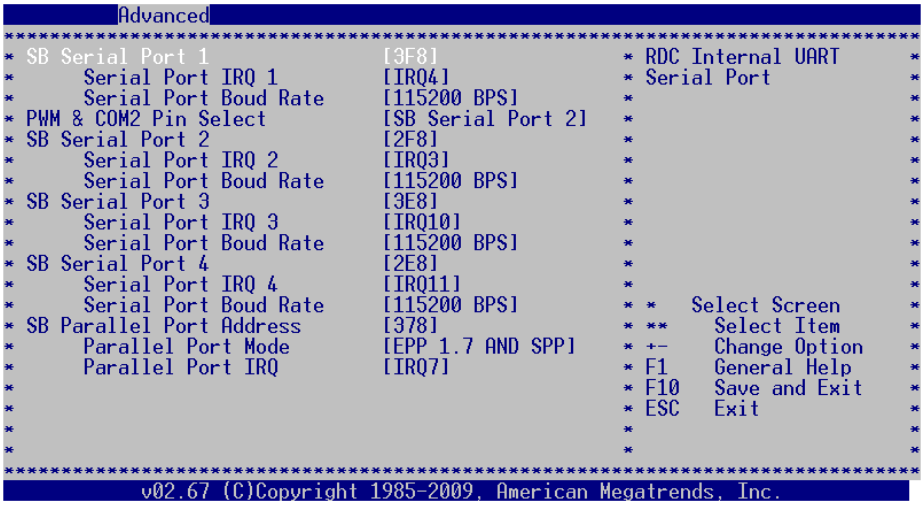
Path: Advanced >Remote Access Configuration >Remote Access [Enabled]



4.3.2 Serial Ports Switching

Serial ports on VDX3-6755 are set RS232 as default. If you need RS485 be your default serial ports. Please contact your contact window directly or mail info@icop.com.tw. And you can refer to the below instruction to select the IRQ mode according to your demands.

Path: Advanced >Serial/Parallel Port Configuration



4.3.3 IDE Configuration

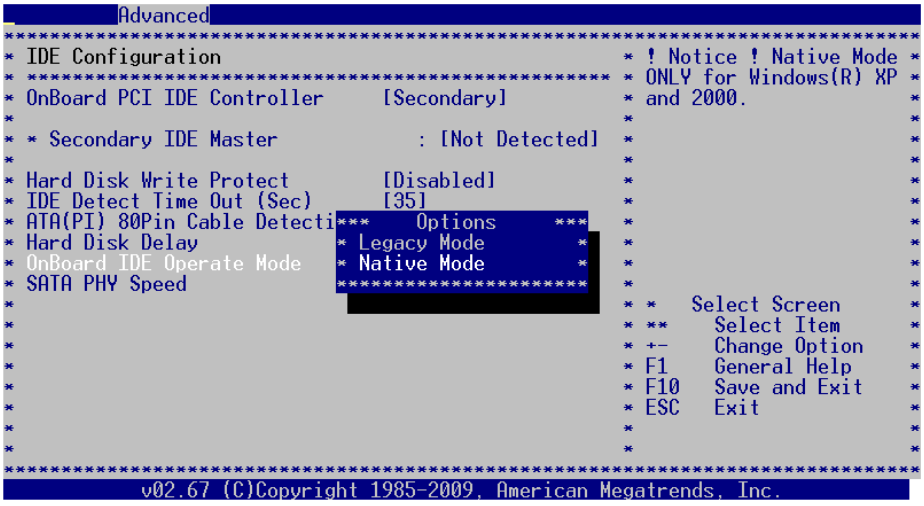
The default IDE configuration is for Windows Operating System, and the setting as below:

Onboard IDE Operate Mode: [Legacy Mode]
IDE Compatibility: [Disabled].

If you would like to use Linux on VDX3-6755, please follow below instructions:

Onboard IDE Operate Mode: [Native Mode]
IDE Compatibility: [Enabled].

Path of Onboard IDE Operate Mode:
Advanced >IDE Configuration >Onboard IDE Operate Mode [Native Mode]

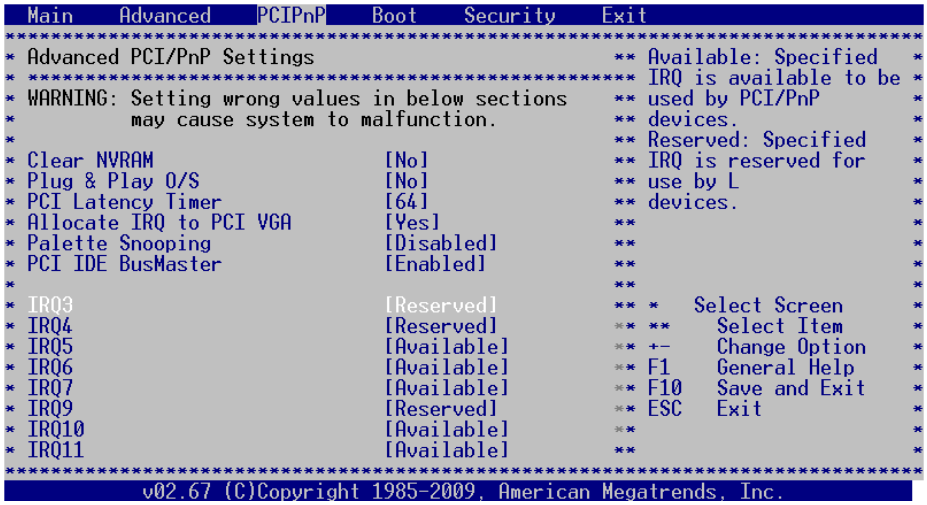


4.3.4 Advanced Configuration

Two statuses for IRQ setting:

[Reserved]: IRQ will free to be allocated by PnP BIOS.
[Available]: IRQ will not free to be allocated by PnP BIOS.

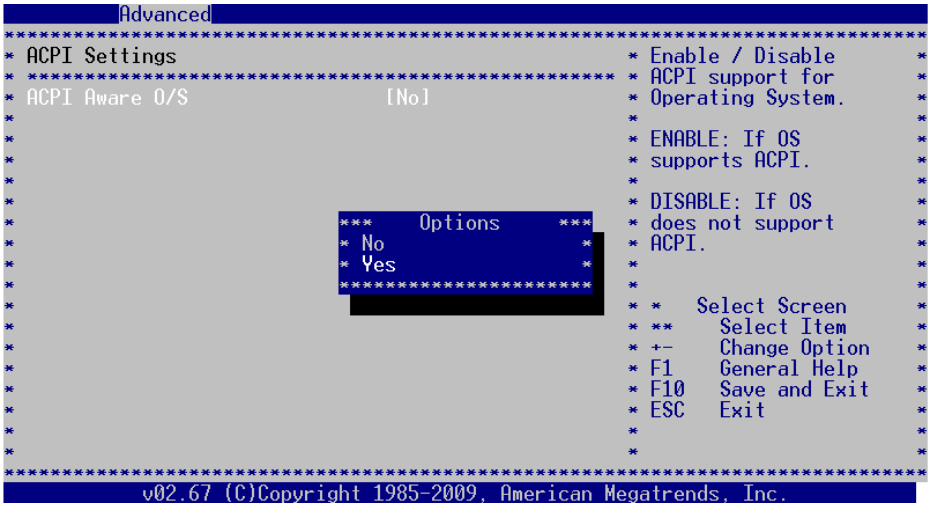
Path: PCIPnP >IRQ



4.3.5 ACPI Enable

To install Windows 7 on ICOP computer boards, please enable ACPI as the following instruction.

Path: Advanced >Power Management Configuration > ACPI Configuration >ACPI Aware O/S

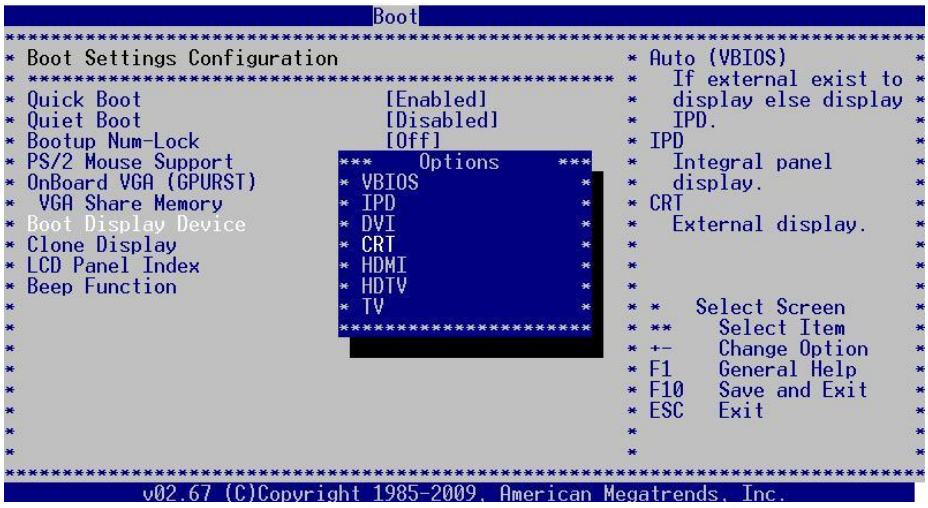


5 Basic LCD Panel Setting

5.1 Introduction

The VDX3-6755 offers two different interfaces which support maximum resolution up to 1920 x 1080 (at 60 MHz) connecting to VGA and LCD Flat Panel with 24bit LVDS.

The default setting of **Boot Display Device [CRT]** and **LCD Panel Index [VBIOS]** with **Clone Display [DISABLED]**.



**Boot Display Device [VBIOS]: LCD and VGA display supported with display setting based on your required LCD specification.

[CRT]: VGA display supported

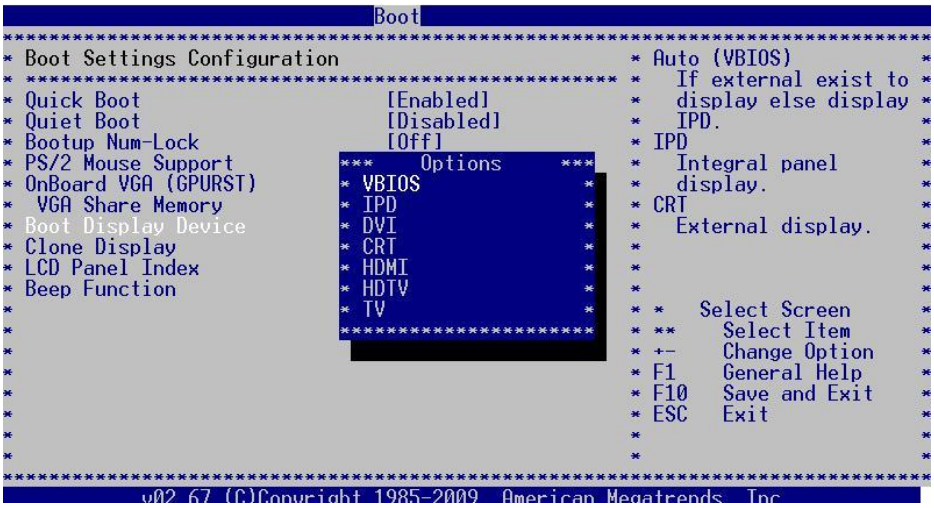
5.2 Basic BIOS Setting for LCD

If you would like to use LCD panel with VDX3-6755, please follow below instruction:

Boot Display Device [VBIOS]
LCD Panel Index according to your LCD resolution from VBIOS to 5.

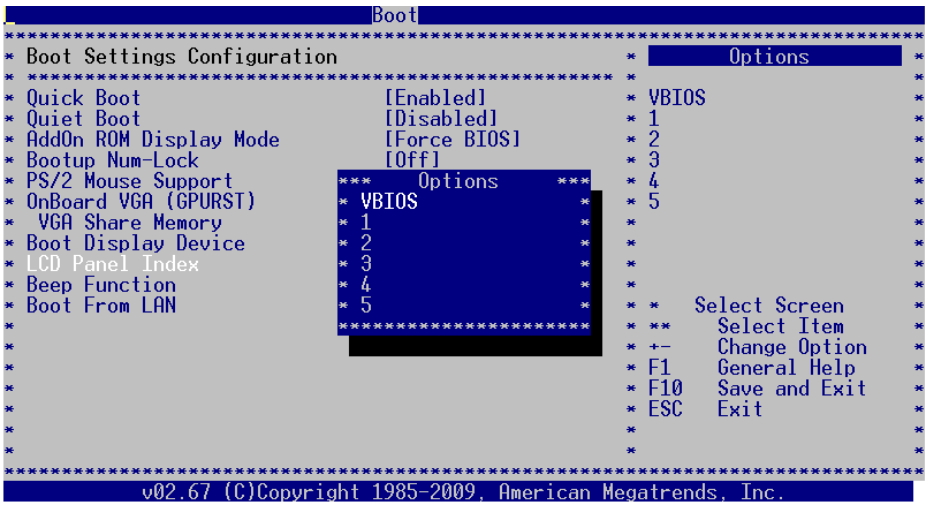
Options	Resolution of the LCD Panel
VBIOS	the Required LCD Specification
1	640 x 480
2	800 x 480
3	800 x 600
4	1024 x 600
5	1024 x 768

Path of Boot Display Device setting:
Boot >Boot Settings Configuration >Boot Display Device [VBIOS]



Path of LCD Panel Index setting:

Boot >Boot Settings Configuration >LCD Panel Index [ ]



***The **[VBIOS]** difference between **Boot Display Device** and **LCD Panel Index**:

Boot Display Device [VBIOS]: Display Output Setting

LCD Panel Index [VBIOS]: Display Resolution Setting

Technical Support Directly from ICOP

To offer you more accurate and specific solutions for the technical situations you have, please prepare the information below before contacting ICOP:

—Product name and serial number

—Description of the H/W environment (i.e.: working temperature, I/O board information, information of connection between main board and IO boards, and/or other devices, etc)

—Description of the S/W environment (i.e: operating system, version, application software, and/or other related information, etc.)

—A detailed description and photos of the technical situation

—Any complement or technical situations you want ICOP more focusing on

User Manual Feedback

To make this user manual more complete, if you have any comments or feedbacks to this manual, please feel free to write to info@icop.com.tw or contact your ICOP sales representative.

Warranty

This product is warranted to be in good working order for a period of one year (12 months) from the date of purchase. Should this product fail to be in good working order at any time during this period, we will, at our option, replace or repair it without additional charge except as set forth in the following terms. This warranty does not apply to products damaged by misuse, modifications, accident or disaster. Vendor assumes no liability for any damages, lost profits, lost savings or any other incidental or consequential damage resulting from the use, misuse of, originality to use this product. Vendor will not be liable for any claim made by any other related party. Return authorization must be obtained from the vendor before returned merchandise is accepted. Authorization can be obtained by calling or faxing the vendor and requesting a Return Merchandise Authorization (RMA) number. Returned goods should always be accompanied by a clear problem description. Should you have questions about warranty and RMA service, please contact us directly.

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