

# VMXP-6427

DM&P Vortex86 MX+ 800MHz

3.5" CPU Module

With

7S/4USB/VGA/LCD/LVDS/AUDIO/LAN/GPIO/ Printer/ CF

512MB or 1GB DDR2 Onboard

## User's Manual

(Revision 1. 1A)

[www.microcomputersystems.com](http://www.microcomputersystems.com)

## Copyright

The information in this manual is subject to change without notice for continuous improvement in the product. All rights are reserved. The manufacturer assumes no responsibility for any inaccuracies that may be contained in this document and makes no commitment to update or to keep current information contained in this manual.

No part of this manual may be reproduced, copied, translated or transmitted, in whole or in part, in any form or by any means without the prior written permission of the ICOP Technology Inc.

©Copyright 2010 ICOP Technology Inc.

Manual No. IUM6427D000-01 Ver.1.0A

April, 2012

Manual No. IUM6427D000-01 Ver.1.1A

September, 2012

## Trademarks Acknowledgment

Vortex86MX+™ is the registered trademark of ICOP Technology Inc.

Other brand names or product names appearing in this document are the properties and registered trademarks of their respective owners. All names mentioned herewith are served for identification purpose only.

# Table of Contents

Table of Contents.....	iii
Chapter 1 Introduction.....	1
1.1 Packing List.....	1
1.3 Product Description.....	2
1.4 Specifications.....	3
1.5 Board Dimension.....	5
Chapter 2 Installation.....	8
2.1 Board Outline.....	8
2.2 Connectors & Jumpers Location.....	9
2.3 Connectors & Jumpers Summary.....	10
2.4 Pin Assignments & Jumper Settings.....	11
2.5 System Mapping.....	21
2.6 Watchdog Timer.....	25
2.7 GPIO.....	26
2.8 PWM.....	27
Chapter 3 Driver Installation.....	28
Appendix.....	29
A. TFT Flat Panel Data Output.....	29
B. TFT Flat Panel Support List.....	30
C. LVDS Flat Panel Support List.....	31
D. Flat Panel Wiring and Lighting.....	32
E. TCP/IP library for DOS real mode.....	33
F. BIOS Default Setting.....	34
Warranty.....	35

This page is blank

# Chapter 1

## 1.1 Packing List

Product Name	Package
SOM304MX-6427	HDD 44P (2.0) cable x 1 RS232 cable x 6 PRINT cable x1 USB cable x2 (USB port x 4) GPIO cable x 1 Audio cable x 2 PS/2 Y cable for KB and Mouse x 1 Screw Kit x 1
SOM304MP-VP	SOM304MP-VP CPU Module x1

## 1.3 Product Description

The VMXP-6427, low-power consumption x86 embedded controller is designed to meet 3.5" Form Factor, and integrated with the following features.

- 800 MHz Vortex86MX+ SoC
  - Either VGA or TFT/ LVDS LCD support
  - 512MB / 1GB DDR2 system memory
  - Enhanced IDE (UltraDMA-100/66/33)
  - 10/100Mbps Ethernet
  - USB 2.0 (host) x4
  - Up to 3serial ports
  - Parallel port
  - 16-bit GPIOs
  - HD Audio
  - SST NAND Flash Onboard (Opt.)
  - 2 watchdog timer
  - PWM 16-24 channels
  - AMI BIOS
  - Single voltage +5V DC
  - Support extended operating temperature range of -20°C to +70°C
- The VMXP-6427 3.5" embedded controller is designed with backward compatibility in mind, to provide migration path for projects facing end-of-life challenges with their existing x86 based 3.5" controller. The VMXP-6427 controller is designed to support legacy software to help extend existing product life cycle without heavy re-engineering.
- VMXP-6427 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 any application that requires small footprint, low-power and low-cost hardware.

# 1.4 Specifications

## ■ SOM304MP-6427

Features	SOM304MP-6427
Connectors	2.00 mm Ø 44-pin box header for IDE x 1 2.00 mm Ø 44-pin box header for LCD x 1 2.00 mm Ø 26-pin box header for Printer x1 2.00 mm Ø 20-pin box header for 16-bit GPIO x1 2.00 mm Ø 16-pin box header for LVDS x 1 2.00 mm Ø 10-pin box header for USB x2 2.00 mm Ø 10-pin box header for RS-232 x6 2.54 mm Ø 3-pin header for RS-485 x 1 2.54 mm Ø 2-pin header for LAN disable x2 2.54 mm Ø 2-pin header for Reset x1 1.27mm Ø 76-pin header for Signal x4 1.25 mm Ø 4-pin Wafer for Line-out/MIC-in x2 External 15-pin D-Sub female connector for VGA x 1 External 9-pin D-Sub male connector for RS-232 x 1 External RJ-45 connector for Ethernet x 1 External USB connector x 1 External Mini DIN connector for Keyboard/Mouse x 1 Type I/II Compact Flash Slot x1
Power Requirement	Single Voltage +5V @ 200mA
Dimension	102 X 146mm (4.01 x 5.75 inches)
Weight	<b>150g</b>
Operating Temperature	0°C ~+60°C -10°C ~+70°C (Optional)

## ■ SOM304MP-VP

Features	SOM304MP-VP
CPU	DM&P SoC CPU Vortex86MX+- 800MHz Real Time Clock with Lithium Battery Backup
Cache	L1:16K I-Cache, 16K D-Cache, L2 Cache 256KB
BIOS	AMI BIOS
Bus Interface	PCI bus standard compliant LPC Bus & SPI Bus
System Memory	512MB/1GB DDR2 Onboard
Watchdog Timer	Software programmable from 30.5 us to 512 seconds x2 sets(Watchdog 1 fully compatible with M6117D)
VGA	Integrated 2D VGA chip VGA and TFT Flat Panel Interface Support (Either VGA or LCD) Share system memory 16MB/32MB, Mono, DSTN, STN, TFT Flat Panel interface support & resolution up to 1280x1024, 16M colors
LAN	Integrated 10/100M Ethernet
AUDIO	ALC 262 (HD Audio)
I/O Interface	Enhanced IDE port (UltraDMA-100/66/33) x1 RS-232 port x3 USB port (Ver2.0) x4 Parallel poet x1 16-bit GPIO port x2 10/100Mbps Ethernet port x1
Flash Disk Support	Onboard SST Flash Disk (512MB/1GB/2GB/4GB are Optional) MSTI EmbedDisk Module (16MB and above) 44-pin IDE to Micro SD (optional)
PWM	16~24 channels
Power Requirement	Single Voltage +5V @ 700mA (with 2GB NAND Flash)
Dimension	70 (L) x70 (W) x10.5 (H) mm (with cover)
Weight	25g
Operating Temperature	0°C ~+60°C -10°C ~+70°C (Optional)



## 1.5 Board Dimension

### ■ SOM304MP-6427

## ■ SOM304MP-VP



# Chapter 2

## 2.1 Board Outline

(Note1: COM1 RS232/422/485 is selected by BIOS setting)

(Note2: Onboard SST Flash Disk: 512MB/1GB/2GB/4GB are Optional)

## 2.2 Connectors & Jumpers Location

### Connectors

## 2.3 Connect ors & Jumpers Summary

Summary Table			
Nbr	Description	Type of Connections	Pin nbrs.
J1	IDE Connector	Box Header, 2.0Ø ,20x2	40-pin
J2	CF Card Master/Slave Select	Pin Header, 2.54Ø , 2x1	2-pin
J3	LINE-OUT	Wafer, 1.25Ø , 4x1	4-pin
J4	VGA	D-Sub Female	15-pin
J5	MIC-IN	Wafer, 1.25Ø , 4x1	4-pin
J6	USB 2	USB connector	4-pin
J7	PS/2 Keyboard / Mouse	Mini-DIN Female	6-pin
J8	USB 1	Box Header,2.0Ø , 5x2	10-pin
J9	USB 0/ USB 3	Box Header,2.0Ø , 5x2	10-pin
J10	10/100Base-T Ethernet LAN	RJ45 Connector	8-pin
J11	GPIO ( Port 0 / 1 /PWMx16)	Box Header, 2.0Ø ,10x2	20-pin
J12	COM1	D-Sub Male	9-pin
J13	RS-485	Molex Header,2.54Ø , 3x1	3-pin
J14	COM3	Box Header, 2.0Ø 5x2	10-pin
J15	PRINT	Box Header, 2.0Ø , 13x2	26-pin
J16	COM4	Box Header, 2.0Ø 5x2	10-pin
J17	LVDS	Pin Header, 2.0Ø 8x2	16-pin
J18	LCD	Box Header,2.0Ø ,22x2	44-pin
J19	Reset	Pin Header, 2.54Ø ,1x2	2-pin
J20	Power Connector	Terminal Block 5.0Ø ,2x1	2-pin
J21	COM5	Box Header, 2.0Ø 5x2	10-pin
J22	COM7	Box Header, 2.0Ø 5x2	10-pin
J23	COM6	Box Header, 2.0Ø 5x2	10-pin
J24	COM8	Box Header, 2.0Ø 5x2	10-pin
CF1	Compact Flash	Type I/II CF Connector	50-pin
PWR LED	Power Active LED (Red)	LED-SMD	
IDE-LED	IDE Active LED (Green)	LED-SMD	
SP1	BUZZER		
S1	RESET SWITCH		

## 2.4 Pin Assignments & Jumper Settings

### J1: IDE (44 Pins)

Pin #	Signal Name	Pin #	Signal Name
1	IDERST	2	GND
3	IDED7	4	IDED8
5	IDED6	6	IDED9
7	IDED5	8	IDED10
9	IDED4	10	IDED11
11	IDED3	12	IDED12
13	IDED2	14	IDED13
15	IDED1	16	IDED14
17	IDED0	18	IDED15
19	GND	20	NC
21	IDEREQ	22	GND
23	IDEIOW	24	GND
25	IDEIOR	26	GND
27	ICHRDY	28	GND
29	IDEACK	30	GND
31	IDEINT	32	NC
33	IDESA1	34	IDECBLID
35	IDESA0	36	IDESA2
37	IDECS-0	38	IDECS1
39	IDELED	40	GND
41	VCC	42	VCC
43	GND	44	NC

### J2: CF Card Master / Slave Select

Pin #	Signal Name
CLOSE	Master
OPEN	Slave

### J3: LINE OUT

Pin #	Signal Name
1	LOUTR
2	GND
3	GND
4	LOUTL

## J4: VGA

Pin #	Signal Name	Pin #	Signal Name
1	R OUT	2	G OUT
3	B OUT	4	NC
5	GND	6	GND
7	GND	8	GND
9	VCC	10	GND
11	NC	12	DDCDAT
13	HSYNC	14	VSYNC
15	DCCCLK		

## J5: MIC-IN

Pin #	Signal Name
1	MIC-INR
2	GND
3	GND
4	MIC-INL

## J6: USB 2

Pin #	Signal Name	Pin #	Signal Name
1	VCC	2	LUSBD2-
3	LUSBD2+	4	GND
5	GGND	6	GGND
7	GGND	8	GGND

## J7: PS/2 KBD / Mouse

Pin #	Signal Name	Pin #	Signal Name
1	KBCLK	2	MSCLK
3	GND	4	KBDAT
5	MSDAT	6	VCC
7	GGND	8	GGND
9	GGND		



## J8: USB 1

Pin #	Signal Name	Pin #	Signal Name
1	VCC	2	VCC
3	LUSBD1-	4	GND
5	LUSBD1+	6	GND
7	GND	8	GND
9	GGND	10	GGND

## J9: USB 0/ USB 3

Pin #	Signal Name	Pin #	Signal Name
1	VCC	2	VCC
3	LUSBD3-	4	LUSBD0-
5	LUSBD3+	6	LUSBD0+
7	GND	8	GND
9	GGND	10	GGND

## J10: LAN /RJ45

Pin #	Signal Name	Pin #	Signal Name
1	TD+	2	TD-
3	RO+	4	NC
5	NC	6	RO-
7	NC	8	NC

## J11: GPIO (Port 0 / Port 1/PWMx16)

Pin #	Signal Name	Pin #	Signal Name
1	GND	2	VCC
3	GP00	4	GP10
5	GP01	6	GP11
7	GP02	8	GP12
9	GP03	10	GP13
11	GP04	12	GP14
13	GP05	14	GP15
15	GP06	16	GP16
17	GP07	18	GP17
19	VCC	20	GND

### J12: COM1 (Optional: TTL/ GPIO-P4 / PWMx8)

Pin #	Signal Name	Pin #	Signal Name
1	DCD1	2	RXD1
3	TXD1	4	DTR1
5	GND	6	DSR1
7	RTS1	8	CTS1
9	RI1	10	GND
11	GND		

### J13: RS485 (Auto direction)

Pin #	Signal Name
1	RS485+
2	RS485-
3	GND

### J14: COM3 (Optional: TTL)

Pin #	Signal Name	Pin #	Signal Name
1	DCD3	2	RXD3
3	TXD3	4	DTR3
5	GND	6	DSR3
7	RTS3	8	CTS3
9	RI3	10	VCC

## J15: PRINT

Pin #	Signal Name	Pin #	Signal Name
1	STB-	14	AFD-
2	PD0	15	ERR-
3	PD1	16	INIT-
4	PD2	17	SLIN-
5	PD3	18	GND
6	PD4	19	GND
7	PD5	20	GND
8	PD6	21	GND
9	PD7	22	GND
10	ACK-	23	GND
11	BUSY	24	GND
12	PE	25	GND
13	SLCT	26	NC

## J16: COM4 (Optional: TTL)

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

## J17: LVDS

Pin #	Signal Name	Pin #	Signal 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

## J18: LCD (DVO) Connector

Pin #	Signal Name	Pin #	Signal Name
1	+3.3V	2	+3.3V
3	LG2	4	LG3
5	LG4	6	LG5
7	NC	8	NC
9	LR0	10	LR1
11	LR2	12	LR3
13	LR4	14	LR5
15	GND	16	NC
17	NC	18	NC
19	NC	20	GND
21	NC	22	NC
23	LB0	24	LB1
25	LB2	26	LB3
27	LB4	28	LB5
29	NC	30	NC
31	LG0	32	LG1
33	GND	34	GND
35	NC	36	LCLK
37	NC	38	LDE
39	NC	40	LHSYNC
41	NC	42	LVSYNC
43	LBACKL	44	LVDDEN

## J19: RESET

Pin #	Signal Name	Pin #	Signal Name
1	Reset	2	GND

## J20: Power Connector (Terminal Block 5.0mm)

Pin #	Signal Name
1	+5V
2	GND

### J21: COM5 (Optional: TTL)

Pin #	Signal Name	Pin #	Signal Name
1	DCD5	2	RXD5
3	TXD5	4	DTR5
5	GND	6	DSR5
7	RTS5	8	CTS5
9	RI5	10	NC

### J22: COM7 (Optional: TTL)

Pin #	Signal Name	Pin #	Signal Name
1	DCD7	2	RXD7
3	TXD7	4	DTR7
5	GND	6	DSR7
7	RTS7	8	CTS7
9	RI7	10	NC

### J23: COM6 (Optional: TTL)

Pin #	Signal Name	Pin #	Signal Name
1	DCD6	2	RXD6
3	TXD6	4	DTR6
5	GND	6	DSR6
7	RTS6	8	CTS6
9	RI6	10	NC

### J24: COM8 (Optional: TTL)

Pin #	Signal Name	Pin #	Signal Name
1	DCD8	2	RXD8
3	TXD8	4	DTR8
5	GND	6	DSR8
7	RTS8	8	CTS8
9	RI8	10	NC

## ■ SOM304MP-VP

## ■ SOM304MP-VP





## 2.5 System Mapping







## 2.6 Watchdog Timer

There are two watchdog timers in Vortex86SX/DX/MX+ CPU. One is compatible with M6117D watchdog timer and the other is new. The M6117D compatible watchdog timer is called WDT0 and new one is called WDT1.

We also provide DOS, Linux and WinCE example for your reference. For more technical support, please visit: <http://www.dmp.com.tw/tech> or download the PDF file: <http://www.dmp.com.tw/tech/vortex86dx/>

## 2.7 GPIO (General Purpose Input / Output)

40 GPIO pins are provided by the Vortex86SX/DX/MX+ for general usage in the system. All GPIO pins are independent and can be configured as inputs or outputs, with or without pull-up/pull-down resistors.

We also offer DOS, Linux and WinCE example for your reference. For more technical support, please visit: <http://www.dmp.com.tw/tech> or download the PDF file: <http://www.dmp.com.tw/tech/vortex86dx/>

## 2.8 PWM (Pulse-width modulation)

Pulse-width modulation (PWM) of a signal or power source involves the modulation of its duty cycle, to either convey information over a communications channel or control the amount of power sent to a load.

The popular applications of pulse width modulation are in speed control of electric motors, volume control of Class D audio amplifiers or brightness control of light sources and many other power electronics applications.

The Vortex86DX /Vortex86MX+ SoC integrated 32 channels of PWM interface enabling the Automation, robotic industry to a New Age x86 SoC platform and we also offer the sample code of PWM which will guide the engineer to control the PWM functionality smoothly.

For more inquire of this sample code that please contact our sales team or mail to: [som@icop.com.tw](mailto:som@icop.com.tw)

# Chapter 3

## VGA

The Vortex86MX+ processor is integrated RDC Display chip which is an ultra-low powered graphics chipset with total power consumption at around 1-1.5 W. It is capable in providing VGA display output up to 1600x1200. With DVO interface, developers could easily connect flat Panel to support TFT and LVDS output.

## LAN

The Vortex86MX+ processor also integrated 10/100Mbps Ethernet controller that supports both 10/100BASE-T and allows direct connection to your 10/100Mbps Ethernet based Local Area Network for full interaction with local servers, wide area networks such as the Internet.

The controller supports: Half / Full-Duplex Ethernet function to double channel bandwidth, auto media detection.

## AUDIO

The ALC262 series are 4-Channel High Definition Audio Codecs with UAA (Universal Audio Architecture) featuring two 24-bit stereo DACs and three 20-bit stereo ADCs, they are designed for high performance multimedia desktop and laptop systems. The ALC262 series incorporates proprietary converter technology to achieve over 100dB Signal-to-Noise ratio playback quality; easily meeting PC2001 requirements and also bringing PC sound quality closer to consumer electronic devices.

## Operating system support

The Vortex86MX+ 6427 3.5" CPU board supports Embedded software: Free DOS, DOS 6.22, Windows CE 6.0, Windows XP Professional, Windows Embedded standard (XPE) and Windows 2000 (SP4).

Vortex86MX+ 6427 also supports most of the popular Linux distributions, for more detail information, please visit DMP official website: <http://www.dmp.com.tw/tech/vortex86mx/>



# Appendix

## A. TFT Flat Panel Data Output

## B. TFT Flat Panel Support List

Size	Brand	Resolution	Model No.
5.7"	TOSHIBA	320x240	LTA057A343F
5.7"	Sharp	320x240 (QVGA / VGA)	LQ057Q3DC02
5.7"	Data image	640x480	FG050710DSSWJG01/DG01
5.7"	Ampire	640x480	AM-640480GTMQW-T00H
7"	Data image	800x480	FG0700A0DSSWBG01
7"	Innolux	800x480	AT070TN83 V.1 (10131)
10.4"	Optrex	640x480	T-55532D104J-LW-A-AAN
12.1"	LG-PHILIPS	800x600	LB121S03

## C. LVDS Flat Panel Support

Size	Brand	Resolution	Model No.
5.7"	Ampire	640x480	AM-640480G4TNQW
7"	Ampire	800x480	AM-800480R3TMQW-A1H
8.4"	AUO	800x600	G084SN03
10.4"	AUO	800x600	G104SN02
12.1"	AUO	800x600	G121SN01

## D. Flat Panel Wiring and Lighting

### ■ Hardware

Before you connect the TFT LCD Flat Panel with Vortex86MX+ 6427, please make sure that the input Voltage of LCD is +3.3V or Not

### ■ BIOS

Please contact or e-mail our regional sales to get the special BIOS for the any TFT LCD Flat Panels.

### ■ Wiring LCD Cable

Please refer to Page 12, 13 (J15: LCD & J16: LVDS connector) and Page22-25. Or for more LCD lighting and integration service, please contact our regional sales or mail to [som@icop.com.tw](mailto:som@icop.com.tw), if you have any questions.

## E. TCP/IP library for DOS real mode

DSock is a TCP/IP library for DOS real mode, which is used by RSIP. It provides simple C functions for programmer to write Internet applications. ICOP also provide Internet examples using DSock: BOOTP/DHCP, FTP server, SMTP client/server, HTTP server, TELNET server, Talk client/server, etc.

DSock provides a lot of example source code. Programmer can add Internet functions to their project easily and save development time. With a utility "MakeROM", programmer also can make a ROM image to fit their application, those examples can be seen in the following Application systems: Mity-Mite Serial Server, Web Camera Tiny Server and RSIP Serial Server.

DSock is free for All ICOP products using M6117D/Vortex86/Vortex86SX/Vortex86DX/Vortex86MX+ CPU and ICOP also provide the business version of DSock for those customers who are using other x86 CPUs. If you would like to use DSock or business version of DSock, Please mail to [info@icop.com.tw](mailto:info@icop.com.tw) or contact your regional sales.

Please download the trial DSock software and Utilities from our website: <http://www.dmp.com.tw/tech/dmp-lib/dsock/>



# Warranty

This product is warranted to be in good working order for a period of one year 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 at no 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 will be 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.