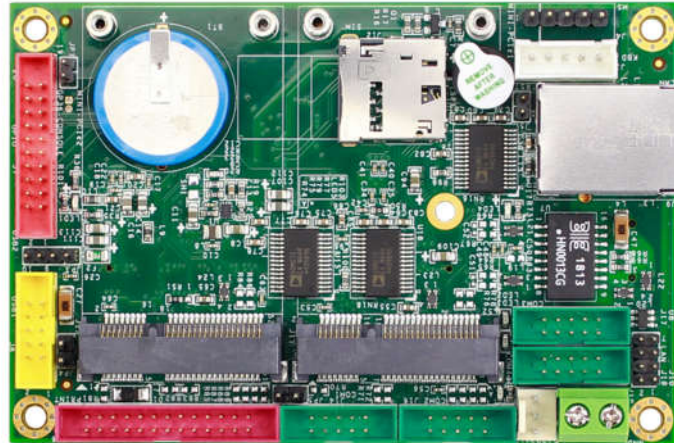




VEX2-6415

with

DM&P Vortex86EX2

600MHz processor

Version 1.1

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Revision History

Revision	Date	Remark
1.0	April, 2020	First version release
1.1	September, 2022	Add MINIPCIE VGA module option in Optional Accessory section

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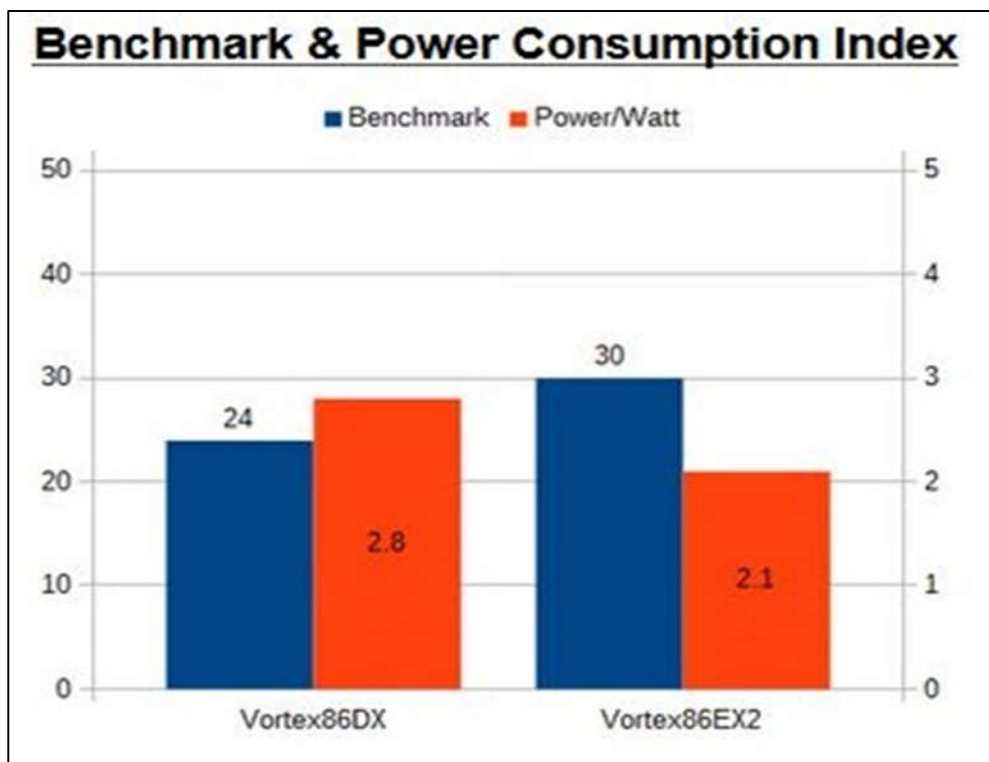
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1 General Information

1.1 Overview

The Vortex86EX2 series is the new generation heterogeneous two-core CPU which utilizes the Master and Slave cores to simultaneously run two different BIOSs & Operating Systems without affecting each other; equipped with various programmable I/O; it's designed for real-time desired industrial/automation applications.

Perfect Replacement Solution for Vortex86DX Platform.



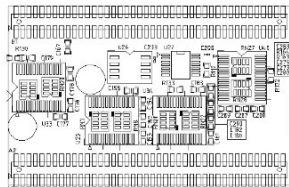
1. CPU instruction upgrade
2. DRAM from DDR2 to DDR3
3. Manufacturing process from 90nm to 65nm

VEX2-6415 is a solution of tiny based on VEX2-DIP168 CPU module, which has lower power consumption and multiple I/O selections.

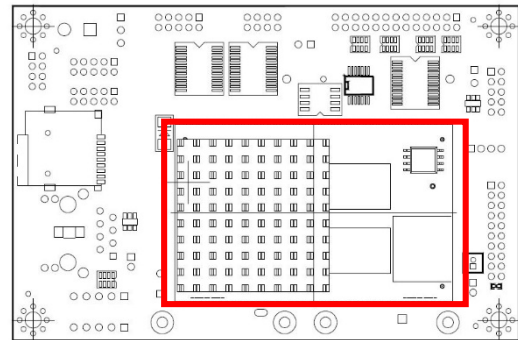
Features of VEX2-6415:

- Vortex86EX2 Processor 600MHz
- 512MB/1GB DDR3 Onboard
- 4S/3U/4/2LAN/16GPIO/2MiniPCIE
- Onboard eMMC / MicroSD socket
- Operation Temperature: -20°C ~ +70°C / -40°C ~ +85°C (Optional)

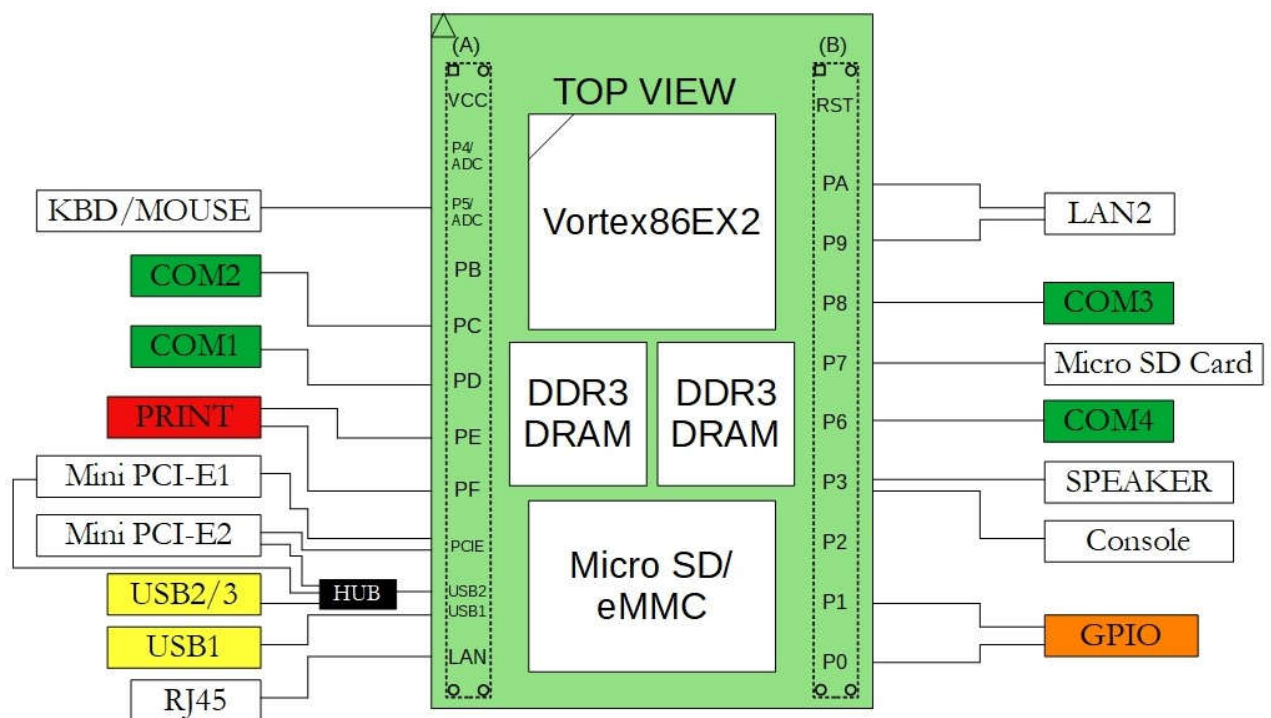
1.2 Block diagram



Vortex86EX2 DIP-168



Vortex86EX2-PCB Bottom View



Vortex86EX2-DIP168

1.3 Specifications

Processor	DM&P Vortex86EX2 Processor 600MHz
RAM	512MB/1GB DDR3 Onboard
IOS	Core boot BIOS
Expansion	Mini PCIe x2
LAN	Integrated 10/100Mbps Ethernet x2
Disk Support	Micro SD Micro SD Card/eMMC
I/O Interface	COM x 4 (2 x RS232/485) 16-bit GPIO x 1 USB (Version. 2.0) x 3 (Option x1)
Connectors	2.54mm 5-pin pin header for Mouse x 1 2.54mm 5-pin box header for Keyboard x 1 2.00mm 20-pin box header for GPIO x 1 2.00mm 2-pin pin header for Reset x 1 2.00mm 10-pin box header for USB x 1 2.00mm 2-pin pin header for Console jumper x 1 2.00mm 8-pin pin header for LAN x 1 2.00mm 10-pin box header for COM x 4 2.00mm 4-pin pin header for USB x 1 (Option) 2-pin header for Power connector x 1 2.00mm 20-pin box header for Print x 1 RJ45 connector x 1 SIM Card slot x 1 Micro SD slot x1
Power Requirement	5VDC @ 480mA
Weight	75g
Dimensions	100 x 66mm (3.94 x 2.6 inches)
Operating Temp.	-20°C to +70°C -40°C to +85°C (Option)
Operating System Support	Windows Embedded Compact 7 Windows Embedded CE6.0 DOS QNX Linux FreeBSD

1.4 Ordering Information

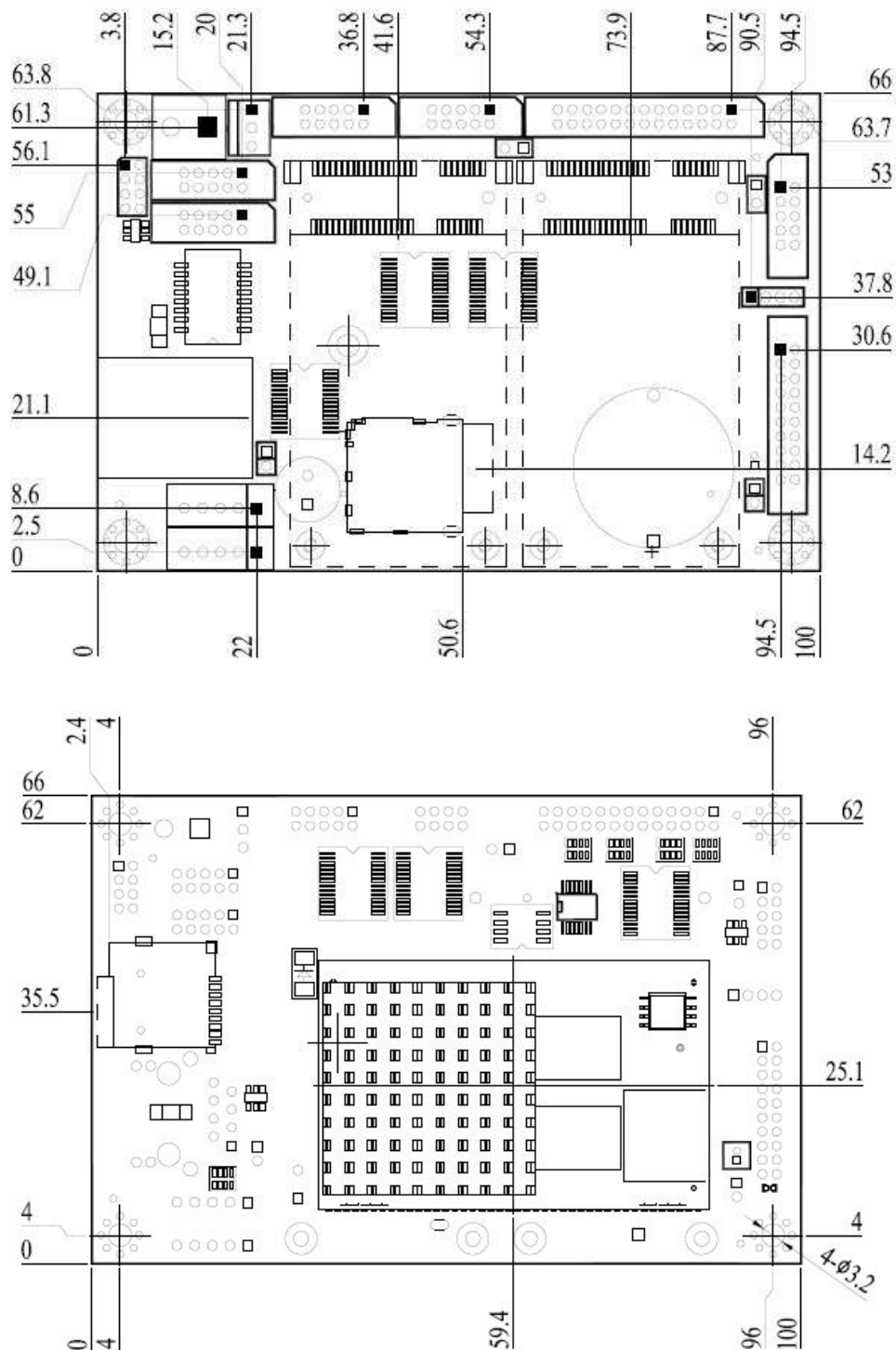
PART NO.	VEX2-6415-4C4NE	VEX2-6415-4C3NE	VEX2-6415-4C4EE
CPU Speed	600MHz	600MHz	600MHz
DRAM (DDR3)	1GB	512MB	1GB
Disk Support	Micro SD x2	Micro SD x2	Micro SD Card 4GB eMMC
LAN	2	2	2
COM	4	4	4
USB (v2.0)	3 (Option x1)	3 (Option x1)	3 (Option x1)
GPIO	16-bit	16-bit	16-bit
Parallel	1	1	1
PS/2	2	2	2
Mini PCIe	2	2	2

Optional Accessory

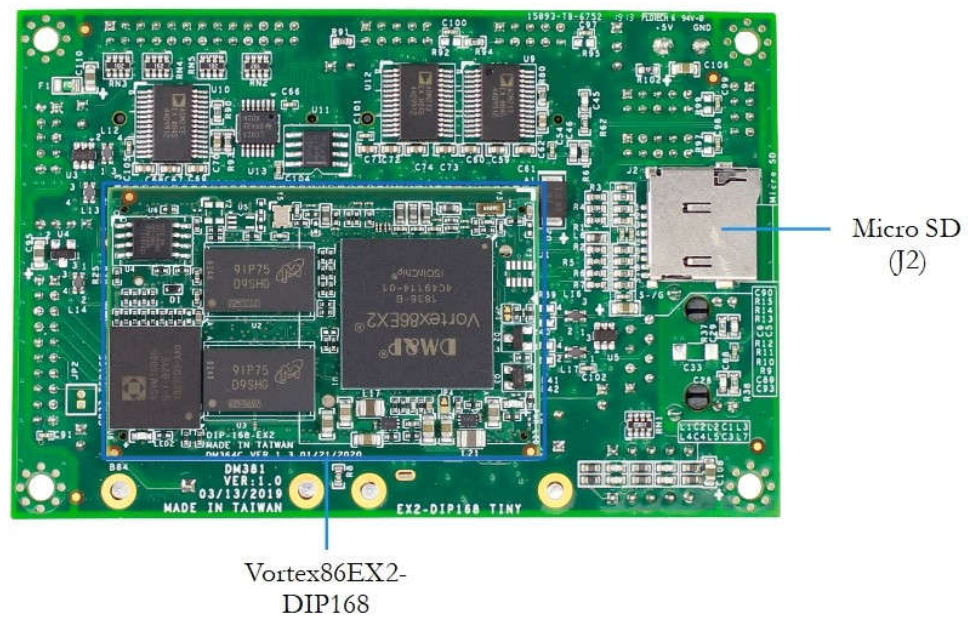
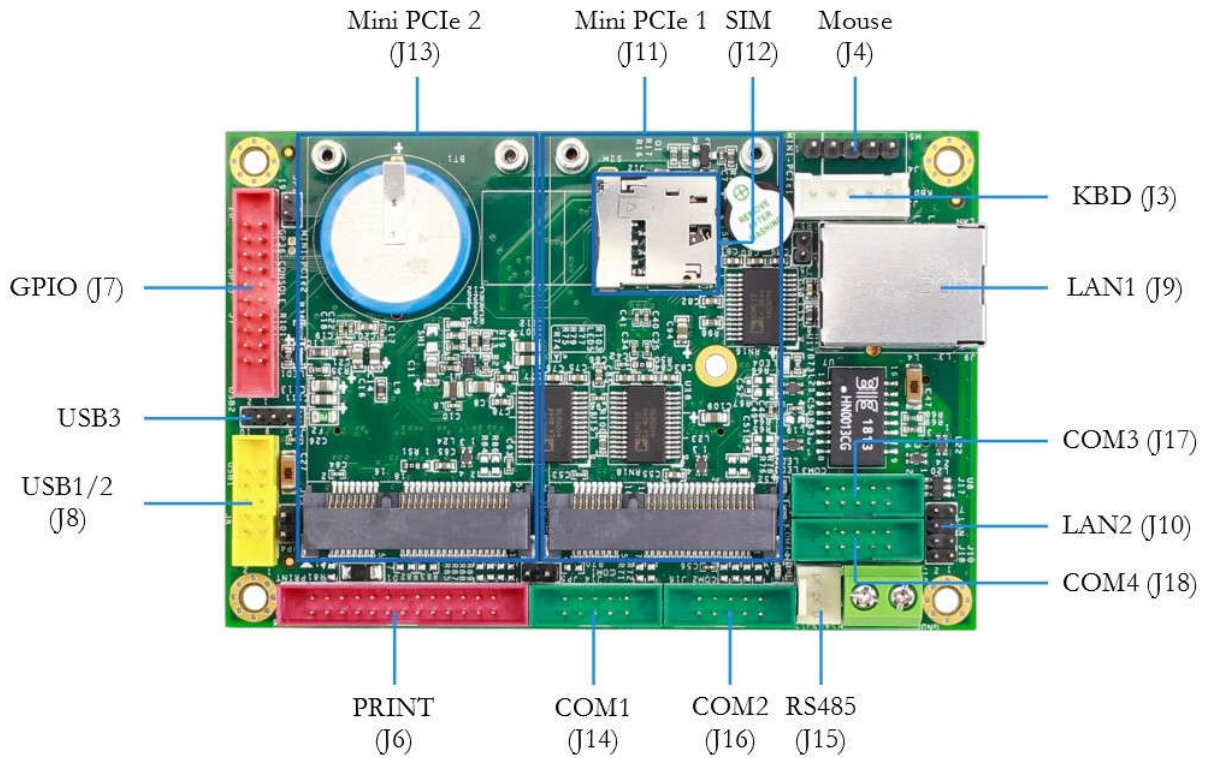
CABLE-SET-6415-4C	Cable set for VEX2-6415-4C (RS232 x4, USB, PRINT, GPIO, LAN, PS2KB x2)
MINIPCI-E-9160	Mini PCI-E VGA card (For VEX/VEX2 module only)

2 Hardware Information

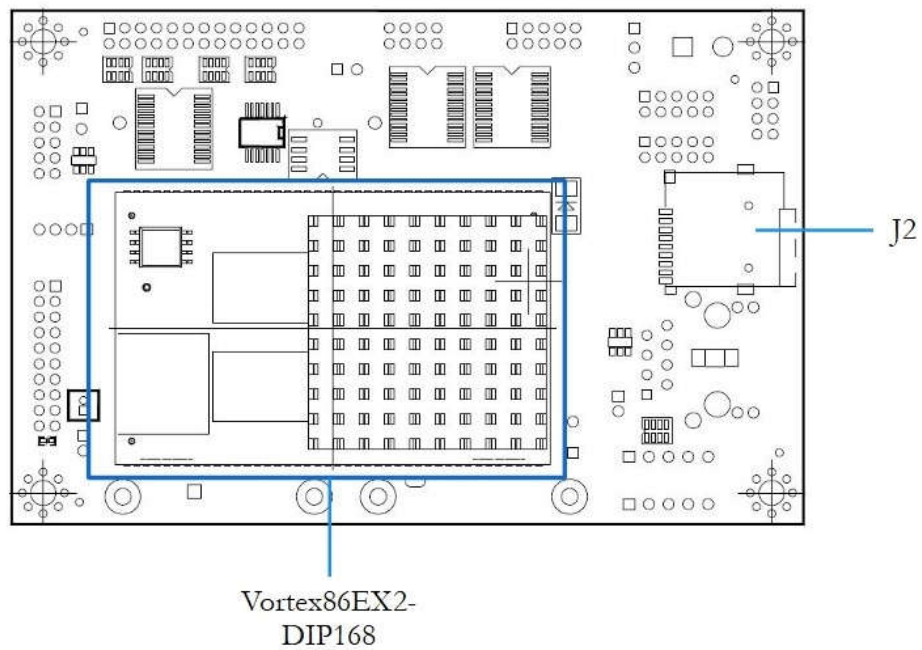
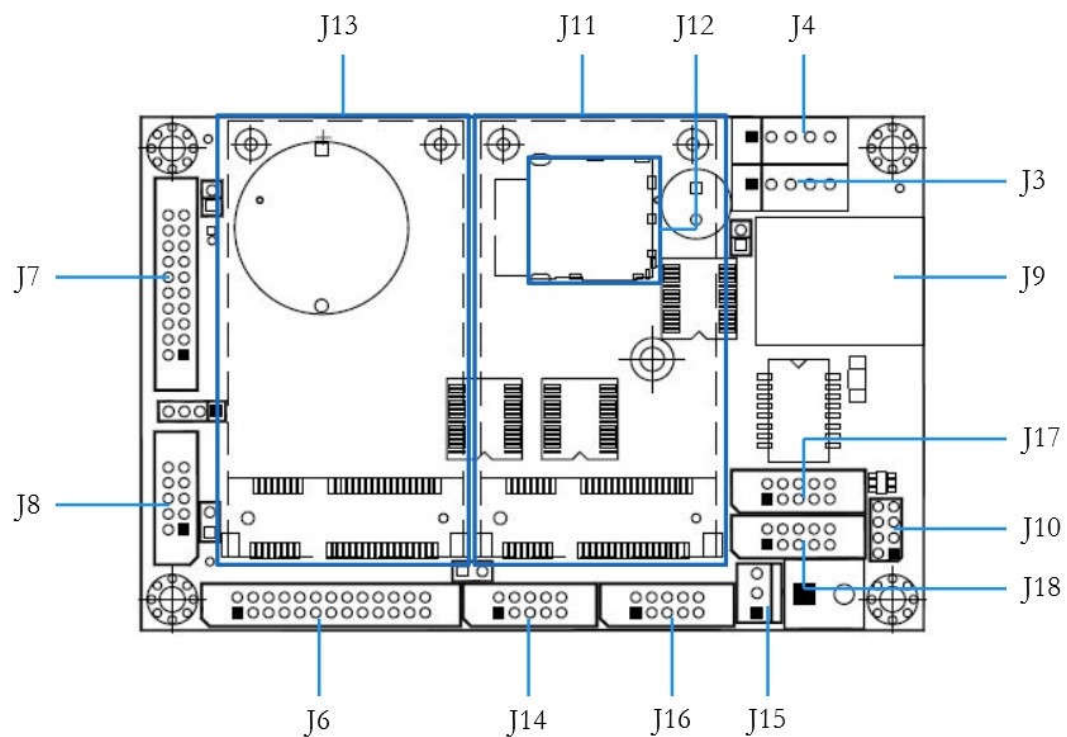
2.1 Dimension



2.2 Board Outline



2.3 Connector Location



2.4 Connector and Jumper Summary

Nbr.	Name	Type of Connections	Nbr of Pin
J2	Micro SD	Micro SD slot	
J3	KBD	Wafer, 2.5mm, 5x1	5
J4	Mouse	Wafer, 2.5mm, 5x1	5
J5	Reset	Pin Header, 2.0mm, 2x1	2
J6	PRINT	Box Header, 2.0mm, 13x2	25
J7	GPIO	Box Header, 2.0mm, 10x2	20
J8	USB	Box Header, 2.0mm, 5x2	10
J9	LAN1	RJ45 connector	
J10	LAN2	Pin Header, 2.0mm, 4x2	8
J11	Mini PCIe1	Standard Mini PCI Express connector	52
J12	SIM card holder	Micro SIM socket	
J13	Mini PCIe2	Standard Mini PCI Express connector	52
J14	COM1 RS232/485 (TTL Option)	Box Header, 2.0mm, 5x2	10
J15	RS485 from COM2	Molex, 2.54mm, 3x1	3
J16	COM2 RS232/485 (TTL Option)	Box Header, 2.0mm, 5x2	10
J17	COM3 RS232 (TTL Option)	Box Header, 2.0mm, 5x2	10
J18	COM4 RS232 (TTL Option)	Box Header, 2.0mm, 5x2	10
J19	Power Connector	Pin Header, 5.0mm, 2x1	2
JP2	Console_EN for COM1	Pin Header, 2.0mm, 2x1	2
JP3	USB (Option)	Pin Header, 2.0mm, 4x1	4
JP4	RS232/485 Jumper Switch for COM1	Header 2, 2x1	2
JP5	RS232/485 Jumper Switch for COM2	Header 2, 2x1	2

2.5 Pin Assignments & Jumper Settings

J3: KBD

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

J4: Mouse

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

J5: Reset

Pin#	Single Name
1.	RESET-
2	GND

J6: PRINT

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

J7: GPIO

Pin#	Single Name	Pin #	Single Name
1.	GND	2	VCC3 (+3.3V)
3	GPIO00	4	GPIO10
5	GPIO01	6	GPIO11
7	GPIO02	8	GPIO12
9	GPIO03	10	GPIO13
11	GPIO04	12	GPIO14
13	GPIO05	14	GPIO15
15	GPIO06	16	GPIO15
17	GPIO07	18	GPIO16
19	VCC3(+3.3V)	20	GND

J8: USB

Pin#	Single Name	Pin #	Single Name
1.	VCC	2	VCC
3	LUSBD1-	4	LGUSBD1-
5	LUSBD1+	6	LGUSBD1+
7	GND	8	GND
9	GND	10	GND

J9: LAN1

Pin#	Single Name	Pin #	Single Name
1.	GND	2	GND
3	RX-	4	GND
5	GND	6	RX+
7	TX-	8	TX+
L2	LINK/ACTIVE	H1	FGND
L3	DUPLEX	H2	FGND

J10: LAN2

Pin#	Single Name	Pin #	Single Name
1.	TX+	2	TX-
3	RX+	4	Duplex
5	LED1+	6	RX-
7	LED0+	8	Link/Active

J11: Mini PCIe1

Pin#	Single Name	Pin #	Single Name
1.	WAKE#	2	VCC3(+3.3V)
3	-	4	GND
5	-	6	-
7	-	8	SIM-VCC
9	GND	10	SIM-IO
11	PE0_CLK-	12	SIM-CLK
13	PE0_CLK+	14	SIM-RST
15	GND	16	SIM-VPP
17	-	18	GND
19	-	20	-
21	GND	22	PE0_RST
23	PE0_RX-	24	VCC(+3.3V)
25	PE0_RX+	26	GND
27	GND	28	-
29	GND	30	-
31	PE0_TX-	32	-
33	PE0_TX+	34	GND
35	GND	36	PE0_USB-
37	GND	38	PE0_USB+
39	VCC3(+3.3V)	40	GND
41	VCC3(+3.3V)	42	LED_WWAN#
43	GND	44	-
45	-	46	-
47	-	48	-
49	-	50	GND
51	-	52	VCC3(+3.3V)

J13: Mini PCIe2

Pin#	Single Name	Pin #	Single Name
1.	WAKE2#	2	VCC3(+3.3V)
3	-	4	GND
5	-	6	-
7	-	8	-
9	GND	10	-
11	PE1_CLK-	12	-
13	PE1_CLK+	14	-
15	GND	16	-
17	-	18	GND
19	-	20	-
21	GND	22	PE1_RST
23	PE1_RX-	24	VCC(+3.3V)
25	PE1_RX+	26	GND
27	GND	28	-
29	GND	30	-
31	PE1_TX-	32	-
33	PE1_TX+	34	GND
35	GND	36	PE1_USB-
37	GND	38	PE1_USB+
39	VCC3(+3.3V)	40	GND
41	VCC3(+3.3V)	42	LED_WWAN#
43	GND	44	-
45	-	46	-
47	-	48	-
49	-	50	GND
51	-	52	VCC3(+3.3V)

J14: COM1 RS232/485 (TTL Option)

Pin#	Single Name	Pin #	Single Name
1.	DCD1/1RS485-	2	RXD1/1RS485+
3	TXD1	4	DTR1
5	GND	6	DSR1
7	RTS1	8	CTS1
9	RI1	10	NC

J15: RS485 from COM2

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

J16: COM2 RS232/485 (TTL Option)

Pin#	Single Name	Pin #	Single Name
1.	DCD2/2RS485-	2	RXD2/2RS485+
3	TXD2	4	DTR2
5	GND	6	DSR2
7	RTS2	8	CTS2
9	RI2	10	NC

J17: COM3 RS232 (TTL Option)

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

J18: COM4 RS232 (TTL Option)

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	NC

J19: Power Connector

Pin#	Single Name
1	VCC(+5V)
2	GND

JP2: Console_EN (For COM1)

Pin#	Status	Assignment
1-2	Open	None
1-2	Short	Console Mode

JP3: USB

(Cable for this USB port is option)

Pin#	Single Name
1	VCC
2	LGUSBD2-
3	LGUSBD2+
4	GND

JP4: RS232/485 Jumper Switch for COM1

Pin#	Status	Assignment
1-2	Open	RS232
1-2	Short	RS485

JP5: RS232/485 Jumper Switch for COM2

Pin#	Status	Assignment
1-2	Open	RS232
1-2	Short	RS485

2.6 System Mapping

Memory Mapping		
Address	Description	Usage
00000000 – 0009FFFF	System RAM	Yes
000A0000 – 000AFFFF	EGA/VGA Video Memory	Yes
000B0000 – 000B7FFF	MDA RAM, Hercules graphics display RAM	Yes
000B8000 – 000BFFFF	CGA display RAM	Yes
000C0000 – 000C7FFF	EGA/VGA BIOS ROM	Yes
000C8000 – 000CFFFF	Expansion ROM Space	
000CC000 – 000CFFFF	Expansion ROM Space	
000D0000 – 000D7FFF	Expansion ROM space	
000D8000 – 000D8FFF	Expansion ROM Space	
000DC000 – 000DFFFF	Expansion ROM Space	
000E0000 – 000EFFFF	BIOS	
000F0000 – 000FFFFF	BIOS	Yes
FEFDBC00 – FEFDBCFF	Standard Open HCD USB Host Controller**	Yes
FEFBB400 – FEFBB4FF	Onboard Ethernet Adapter**	Yes
FEFDB800 – FEFDBFFF	Standard Enhanced PCI to USB Host Controller**	Yes

** : Dynamical configuring PCI device: Meaning that the location of each allocation may be different

I/O Mapping		
Address	Description	Usage
0000h – 000Fh	DMA 8237-1	Yes
0020h – 0021h	PIC 8259-1	Yes
0022h – 0023h	Indirect Access Registers (6117D configuration port)	Yes
0040h – 0043h	Timer Counter 8254	Yes
0060h	Keyboard / Mouse data port	
0061h	Port B + NMI control port	Yes
0062h – 0063h	8051 download 4k address counter	
0064h	Keyboard/ Mouse status/ command port	
0065h	WatchDog0 reload counter	
0070h – 0071h	CMOS RAM port	Yes
0072h – 0075h	MTBF control register	Yes

0078h – 007Ch	GPIO port 0,1,2,3,4 default setup	Yes
0080h – 008Fh	DMA page register	
0092h	System control register	Yes
0093h – 0097h	GPIO port 6,7,8,9, A direction control	Yes
0098h – 009Dh	GPIO port 0,1,2,3,4,5 direction control	Yes
00A0h – 00A1h	PIC 8259-2	Yes
00A8h – 00ADh	WatchDog1 control counter	Yes
00AEh	WatchDog1 reload counter	Yes
00C0h – 00DFh	DMA 8237-2	Yes
00E0h – 00EFh	DOS 4G Page access	Yes
0100h – 0105h	GPIO port 5,6,7,8,9, A default setup	Yes
0170h – 0177h	IDE 1(IRQ 15)	Yes
0278h – 027Fh	Printer port (IRQ7, DMA 0)	Yes
02E8h – 02EFh	COM4 (IRQ 11)	Yes
02F8h – 02EFh	COM2 (IRQ 3)	Yes
03E8h – 03EFh	COM3 (IRQ 10)	Yes
03F6h	IDE1 ATAPI device control write only register	Yes
03F8h – 03FFh	COM1 (IRQ 4)	Yes
0480h – 048Fh	DMA High page register	Yes
0490h – 0499h	Instruction counter register	Yes
04D0h – 04D1h	8259 Edge / level control register	Yes
0CF8h – 0CFFh	PCI configuration port	Yes
DE00h – DEFFh	On board LAN**	Yes
FC00h – FC05h	SPI Flash BIOS control register	Yes
FC08h – FC0Dh	External SPI BUS control register	Yes

**.: Dynamical configuring PCI device: Meaning that the location of each allocation may be different

IRQ Mapping		
Address	Description	Usage
IRQ0	System Timer	Yes
IRQ1	Keyboard Controller	Yes
IRQ2	Cascade for IRQ8~15	
IRQ3	Serial port 2	Yes
IRQ4	Serial port 1	Yes
IRQ5	USB	Yes
IRQ6	USB	
IRQ7	Printer Port	Yes
IRQ8	Real Timer Clock	Yes
IRQ9	NONE	Yes
IRQ10	Serial Port 3	Yes
IRQ11	Serial Port 4	Yes
IRQ12	Mouse	Yes
IRQ13	Math Coprocessor	Yes
IRQ14	Multimedia Device	Yes
IRQ15	Hard Disk Controller #2	Yes

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.

For details, please kindly visit the following link:

<http://tech.icop.com.tw/>

Technical support

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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