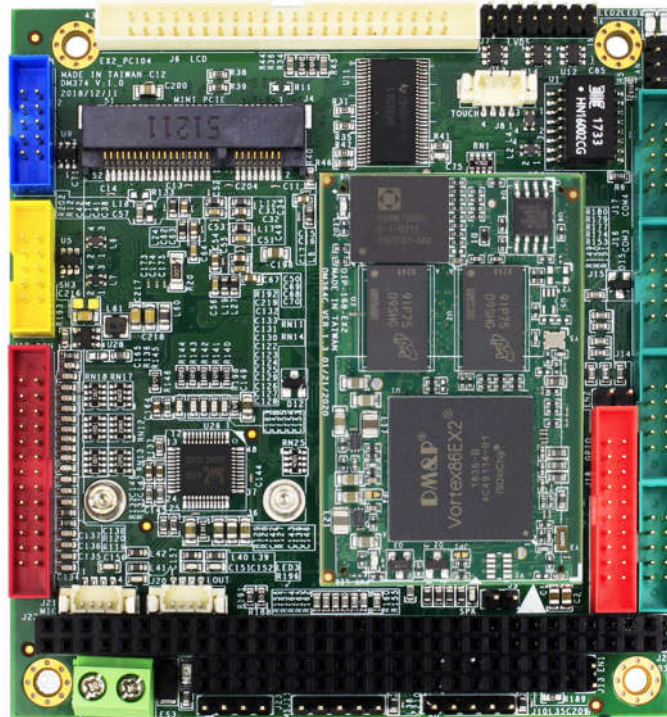




VEX2-6454

with
DM&P Vortex86EX2
600MHz processor

Version 1.0

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Revision History

Revision	Date	Remark
1.0	August, 2019	First version release

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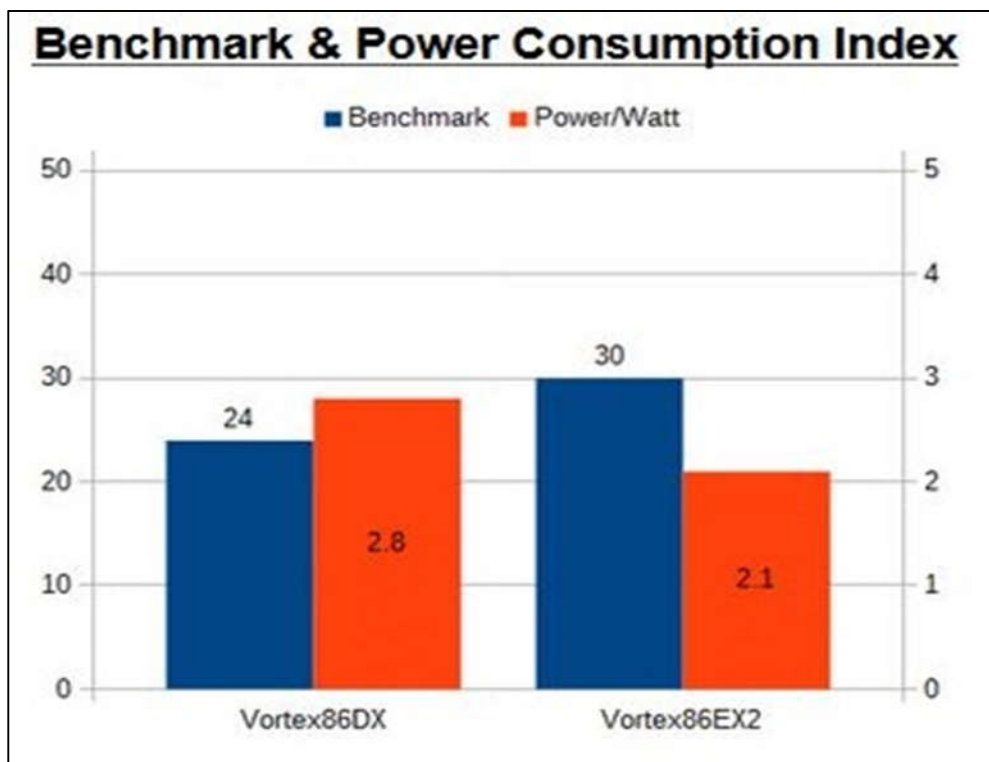
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1 General Information

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 or 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

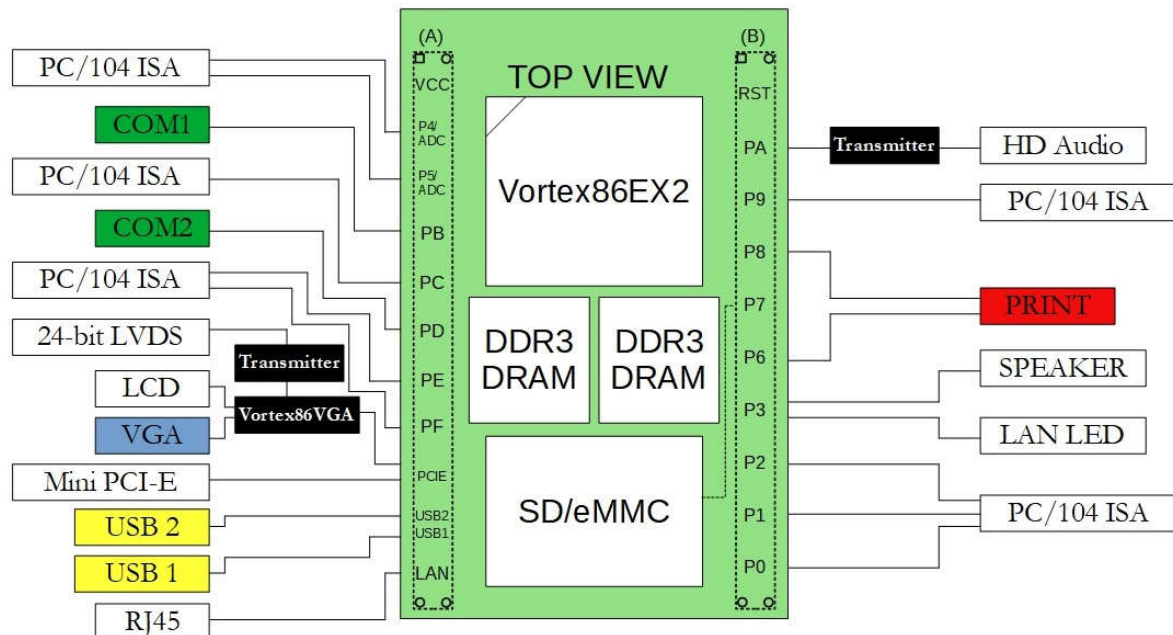
VEX2-6454 is a solution of PC/104 based on VEX2-DIP168 CPU module with PC/104 carrier board, which has lower power consumption and multiple I/O selections.

Features of VEX2-6454:

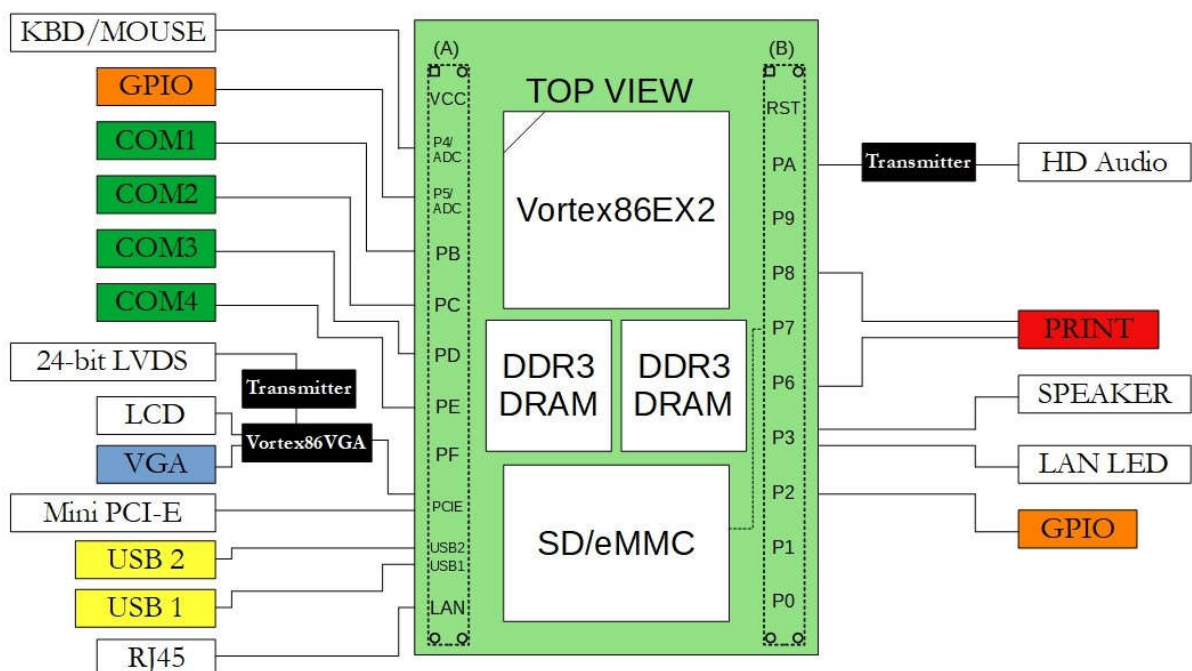
- DM&P SoC Vortex86EX2 - 600 MHz
- 512MB/1GB DDR3 onboard
- 4S/2U/VGA/LCD/LVDS/LAN/LPT/Audio/16-bit GPIO
- Temperature: -20 ~ +70°C/-40 ~ +85°C(Option)
- 16-bit x-ISA interface
- Touch Controller (Option)
- Micro SD socket /eMMC Onboard (Option)

1.2 Block diagram

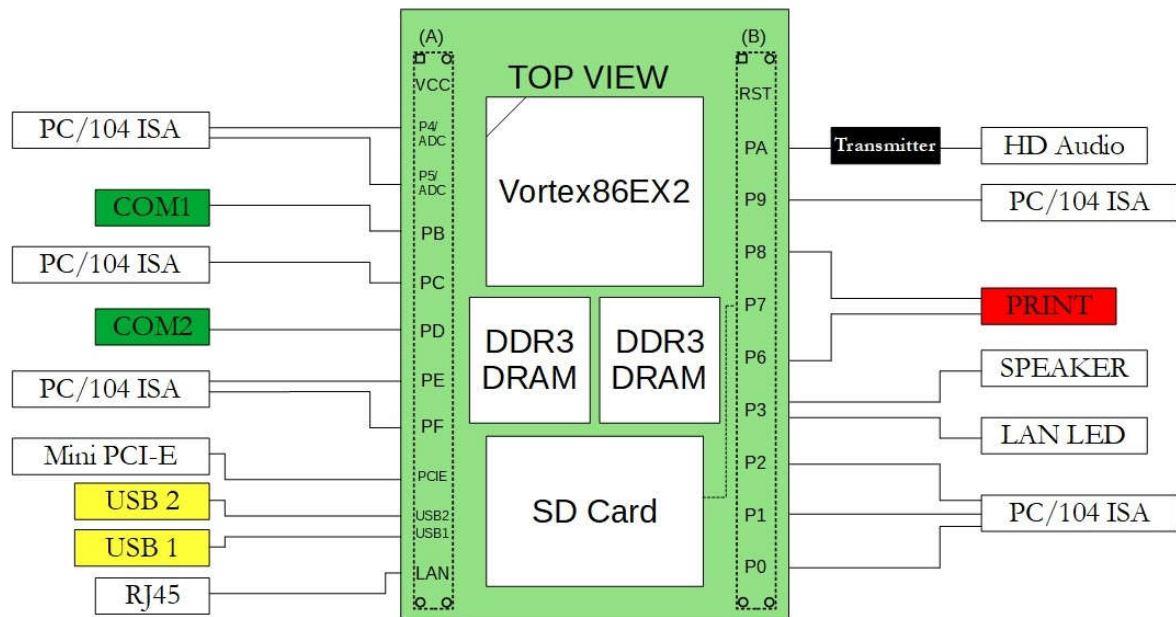
VEX2-6454-2C4IEE/VEX2-6454-2C4INE



VEX2-6454-4C4EE/VEX2-6454-4C4NE



VEX2-6450-2C3INE



1.3 Specifications

Processor	DM&P Vortex86EX2 Processor 600MHz
RAM	512MB/1GB DDR3 Onboard
IOS	Core boot BIOS
Expansion	ISA Bus x1 (Option) Mini PCIe x1
Display	Integrated 2D VGA chip with VGA and TFT Flat Panel Interface Support VGA: resolution up to 1024 x 768 @ 60Hz LCD: resolution up to 1024 x 768 @ 60Hz LVDS: resolution up to 1024 x 768 @ 60Hz, single channel 24-bit
LAN	Integrated 10/100Mbps Ethernet x1
Audio	Realtek ALC262 Buzzer
Disk Support	Micro SD Card/eMMC (Option)
I/O Interface	USB (ver2.0) x2 Parallel x1 COM x4 (2x RS232/485) (Option) PS/2 x2 (Option) 16-bit GPIO port x1 (Option) 4-wire touch x1 (Option)
Connectors	2.0mm 8-pin header for LAN x1 2.0mm 2-pin header for Reset x1 Terminal block for Power input x1 2.0mm 10-pin box header for USB x1 2.0mm 44-pin box header for LCD x1 2.0mm 26-pin box header for Parallel x1 2.0mm 10-pin box header for VGA x1 2.0mm 16-pin header for LVDS x1 2.54mm 4-pin header for Power output x1 2.54mm 5-pin header for Mouse x1 (Option) 2.0mm 10-pin box header for COM x4 (Option) Standard PC/104 connector x1 (Option) 2.54mm 5-pin header for Keyboard x1 (Option) 2.0mm 10-header for 16-bit GPIO x1 (Option)

Power Requirement	5VDC @ 660mA
Weight	86g
Dimensions	90 x 96mm
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

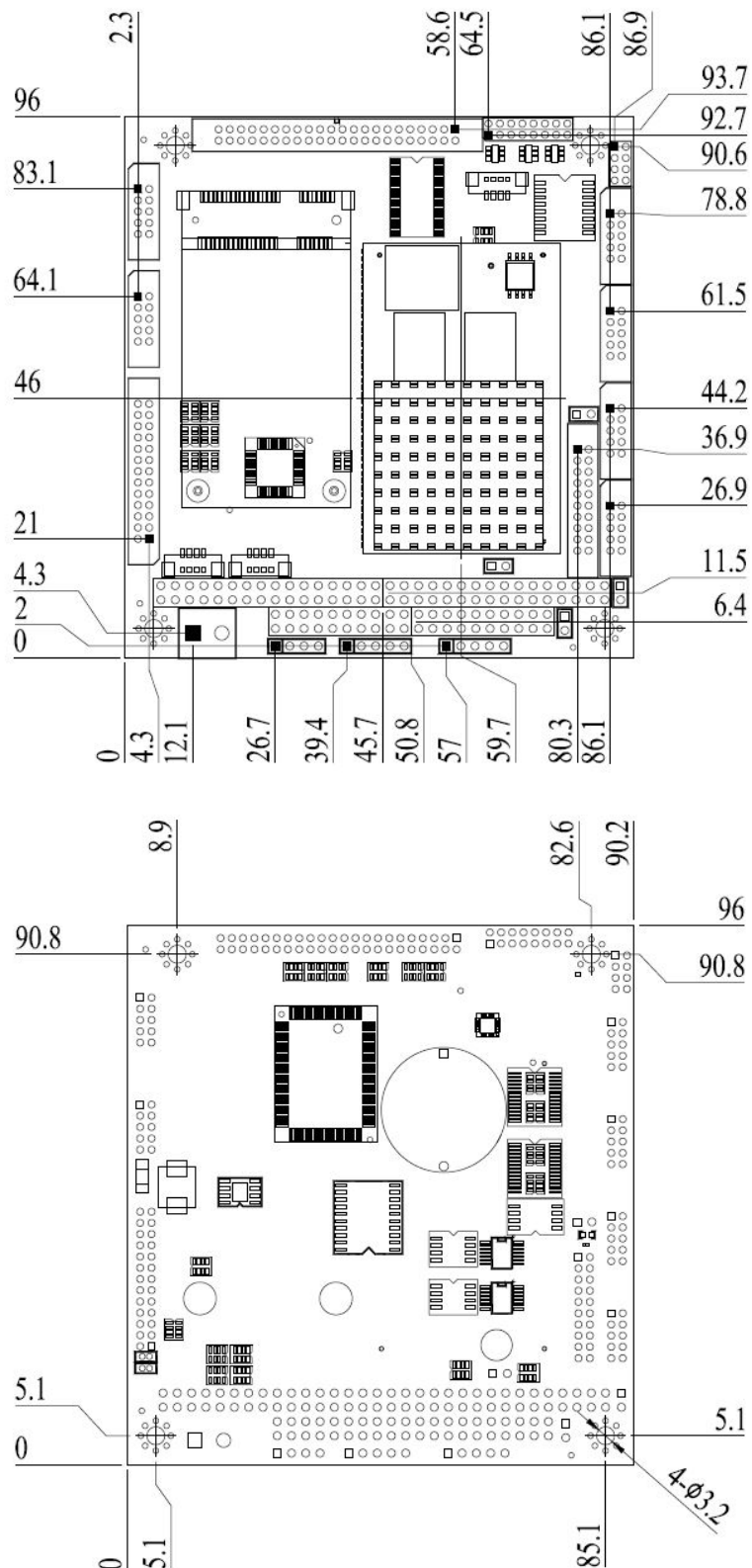
PART NO.	VEX2-6454-2C4IEE	VEX2-6454-4C4EE	VEX2-6450-2C3INE	VEX2-6454-2C4INE	VEX2-6454-4C4NE
CPU Speed	600MHz	600MHz	600MHz	600MHz	600MHz
DRAM (DDR3)	1GB	1GB	512MB	1GB	1GB
Disk Support	4GB eMMC	4GB eMMC	Micro SD	Micro SD	Micro SD
Display	VGA LCD LVDS	VGA LCD LVDS	-	VGA LCD LVDS	VGA LCD LVDS
LAN	1	1	1	1	1
COM	2	4	2	2	4
USB (v2.0)	2	2	2	2	2
GPIO	-	16 bits	-	-	16 bits
Parallel	1	1	1	1	1
PS/2	-	2	-	-	2
Audio	Lin-out MIC-in	Lin-out MIC-in	Lin-out MIC-in	Lin-out MIC-in	Lin-out MIC-in
PC104 ISA	1	-	1	1	-
Mini PCIe	1	1	1	1	1

Optional Accessary

CABLE-SET-6454-4C	Cable set for VEX2-6454-4C (RS232 x4, USB, PRINT, GPIO, LAN, VGA, Audio x2, PS2KB x2)
CABLE-SET-6454-2C	Cable set for VEX2-6454-2C (RS232 x2, USB, PRINT, LAN, VGA, Audio x2)
CABLE-SET-6450-2C	Cable set for VEX2-6454-2C (RS232 x2, USB, PRINT, LAN, Audio x2)

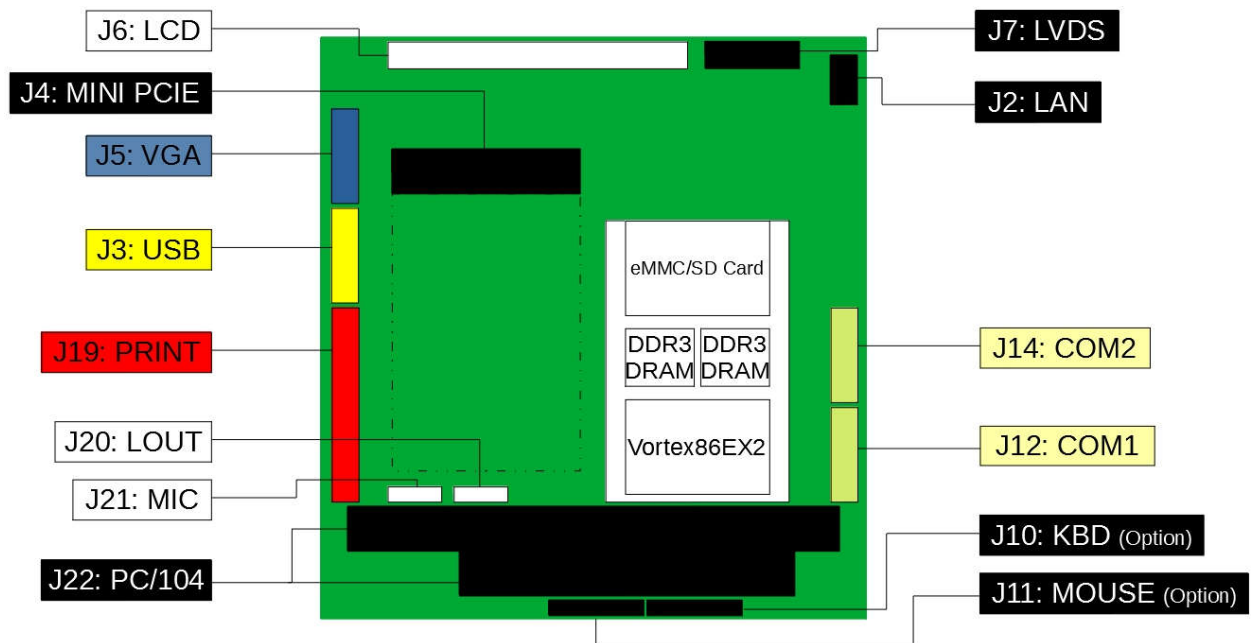
2 Hardware Information

2.1 Dimension

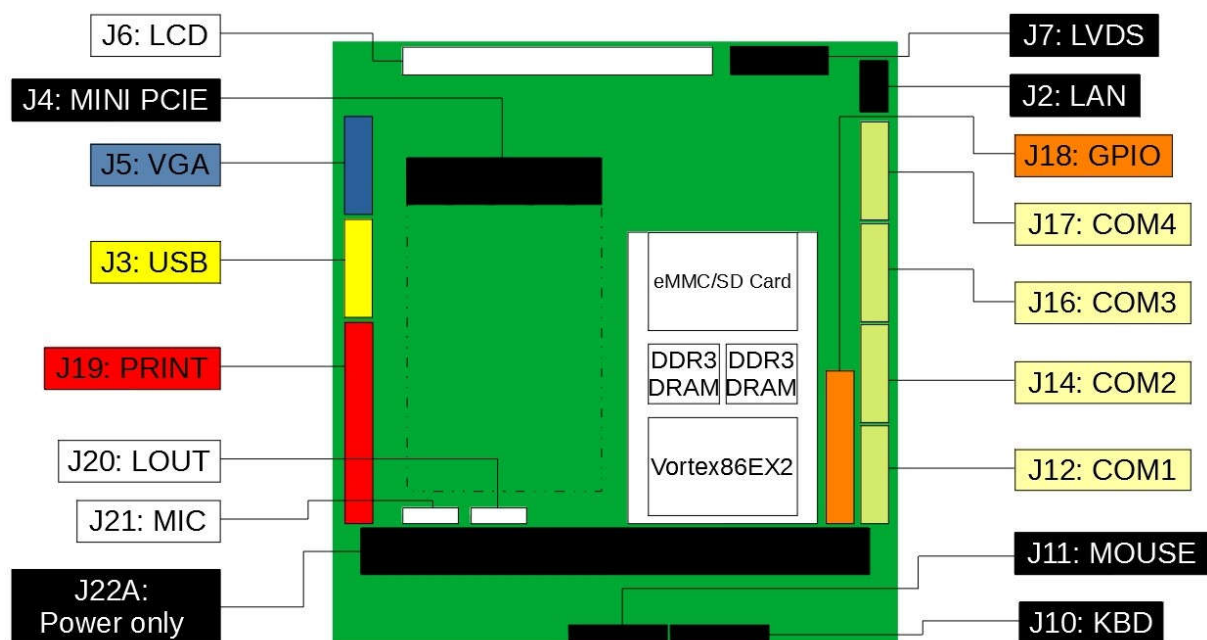


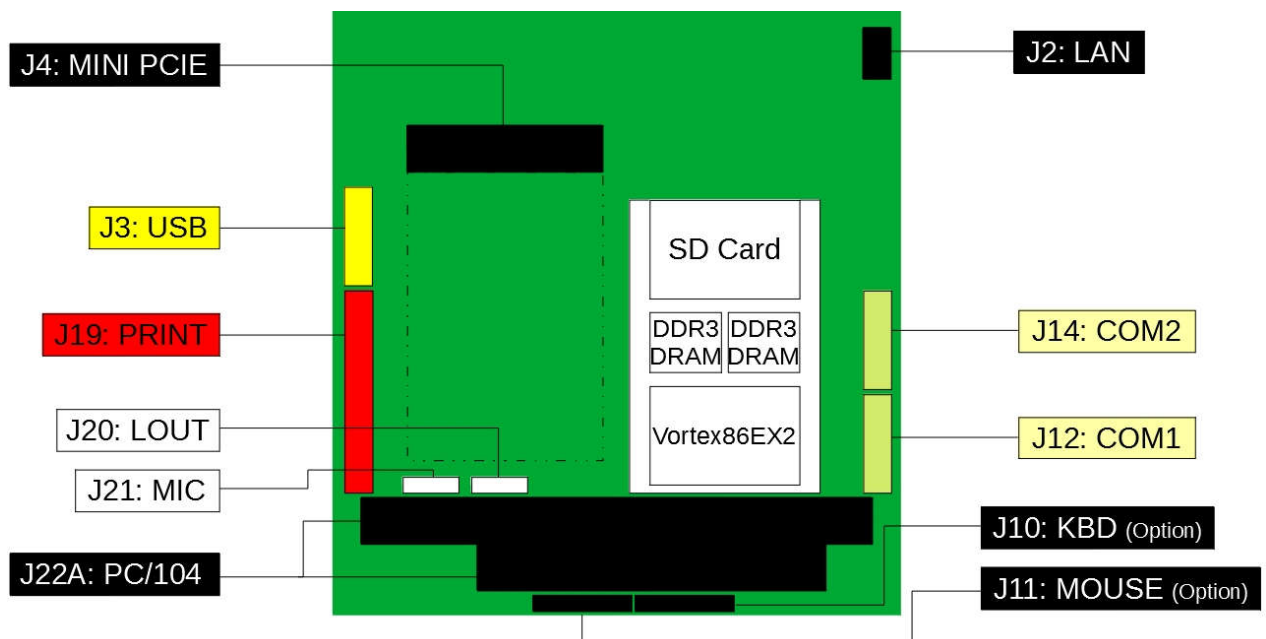
2.2 Board Outline

[VEX2-6454-2C4IEE/VEX2-6454-2C4INE](#)

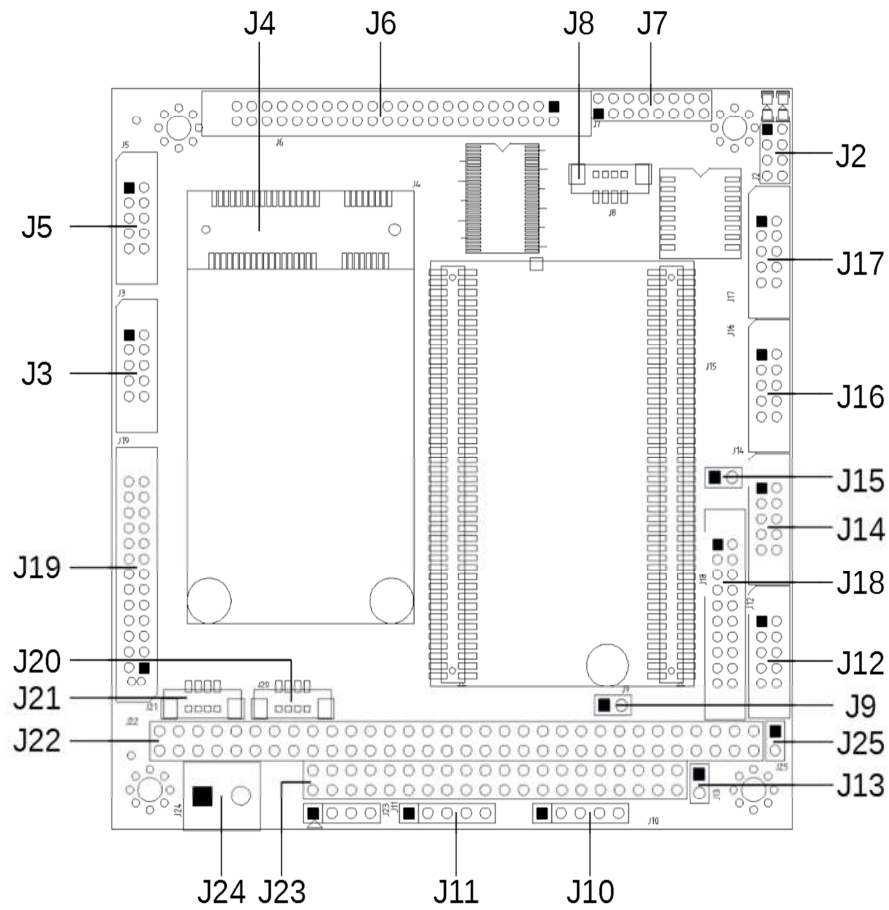


[VEX2-6454-4C4EE/VEX2-6454-4C4NE](#)



[VEX2-6450-2C3INE](#)

2.3 Connector Location



2.4 Connector and Jumper Summary

Nbr.	Name	Type of Connections	Nbr of Pin
J2	LAN	Pin Header, 2.0mm, 4x2	8
J3	USB	Box Header, 2.0mm, 5x2	10
J4	Mini PCIe	Standard Mini PCI Express Connector	52
J5	VGA	Box Header, 2.0mm, 5x2	10
J6	LCD	LCD Connector, 2.0mm, 22x2	44
J7	LVDS	Pin Header, 2.0mm, 8x2	16
J8	Resistive Touch Screen	Wafer, 1.25mm, 4x1	4
J9	Buzzer	Pin Header, 2.0mm, 2x1	2
J10	PS/2 KBD	Pin Header, 2.54mm, 5x1	5
J11	PS/2 Mouse	Pin Header, 2.54mm, 5x1	5
J12	COM1 RS232/485	Box Header, 2.0mm, 5x2	10
J13	RS232/485 Jumper Switch for COM1	Pin Header, 2.54mm, 2x1	2
J14	COM2 RS232/485	Box Header, 2.0mm, 5x2	10
J15	RS232/485 Jumper Switch for COM2	Pin Header, 2.54mm, 2x1	2
J16	COM3 RS232	Box Header, 2.0mm, 5x2	10
J17	COM4 RS232	Box Header, 2.0mm, 5x2	10
J18	GPIO Port 0/1	Box Header, 2.0mm, 10x2	20
J19	Print	Box Header, 2.0mm, 13x2	26
J20	Line - OUT	Wafer, 1.25mm, 4x1	4
J21	MIC – IN	Wafer, 1.25mm, 4x1	4
J22A	PC/104 Connector – 64 pin	Box Header, 2.54mm, 32x2	64
J22B	PC/104 Connector – 40 pin	Box Header, 2.54mm, 20x2	40
J23	4P Power Source	Pin Header, 2.54mm, 4x1	4
J24	Power CONN.	Pin Header, 5.0mm, 2x1	2
J25	RESET	Pin Header, 2.54mm, 2x1	2
PWR LED	Power Active LED3(Red)	SMD LED	
LED 1	LAN Duplex LED(Yellow)	SMD LED	
LED 2	LAN LINK/Active LED(Green)	SMD LED	

2.5 Pin Assignments & Jumper Settings

J2: LAN

Pin#	Single Name	Pin #	Single Name
1.	LAN TX+	2	LAN TX-
3	LAN RX+	4	DUPLEX
5	LED0+	6	LAN RX-
7	LED1+	8	LINK#ACTIVE

J3: USB

Pin#	Single Name	Pin #	Single Name
1.	VCC(+5V)	2	VCC(+5V)
3	USB D1-	4	USB D2-
5	USB D1+	6	USB D2+
7	GND	8	GND
9	GGND	10	GGND

J4: Mini PCIe

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

J5: VGA

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

J6: 18-bit/24-bit LCD

Pin#	DIGITAL 18-BIT	RGB 24-BIT
1	3.3V	3.3V
2	3.3V	3.3V
3	G2	G4
4	G3	G5
5	G4	G6
6	G5	G7
7		R0
8		R1
9	R0	R2
10	R1	R3
11	R2	R4
12	R3	R5
13	R4	R6
14	R5	R7
15	GND	GND
16		
17		
18		
19	NC	NC
20	GND	GND
21		B0
22		B1
23	B0	B2
24	B1	B3

25	B2	B4
26	B3	B5
27	B4	B6
28	B5	B7
29		G0
30		G1
31	G0	G2
32	G1	G3
33		
34		
35		
36	CLK	CLK
37		
38	DEN	DEN
39		
40	HSYNC	HSYNC
41		
42	VSYNC	VSYNC
43	ADJ	ADJ
44	VDDEN	VDDEN

*For more detail, please contact ICOP sales

J7: LVDS

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

J8: Resistive Touch Screen (Option)

Pin#	Single Name	Pin #	Single Name
1.	Y-	2	X-
3	Y+	4	X+

J9: Buzzer

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

J10: PS/2 KBD (For VEX2-6454-4C4NE/VEX2-6454-4C4EE)

Pin#	Single Name	Pin #	Single Name
1.	KBCLK	2	KBDATA
3	NC	4	GND
5	VCC(+5V)		

J11: PS/2 Mouse (For VEX2-6454-4C4NE/VEX2-6454-4C4EE)

Pin#	Single Name	Pin #	Single Name
1.	MSCLK	2	MSDATA
3	NC	4	VCC(+5V)
5	GND		

J12: 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

J13: RS232/485 Jumper Switch for COM1

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

J14: 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

J15: RS232/485 Jumper Switch for COM2

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

J16: COM3 RS232 (TTL Option) (For VEX2-6454-4C4NE/VEX2-6454-4C4EE)

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

J17: COM4 RS232 (TTL Option) (For VEX2-6454-4C4NE/VEX2-6454-4C4EE)

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

J18: GPIO Port 0/1 (For VEX2-6454-4C4NE/VEX2-6454-4C4EE)

Pin#	Single Name	Pin #	Single Name
1.	GND	2	VCC(+5V)
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(+5V)	20	GND

J19: 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	ACK-
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		

J20: Line-OUT

Pin#	Single Name
1	Line OUT_R
2	GND
3	GND
4	Line OUT_L

J21: MIC-IN

Pin#	Single Name
1	MIC_IN_R
2	GND
3	GND
4	MIC_IN_L

J22A: PC/104 Connector – 64 pin (For VEX2-6454-2C4IEE/VEX2-6450-2C3INE)

Pin#	Single Name	Pin #	Single Name
1.	IOCHCK	2	GND
3	SD7	4	RSTDRV
5	SD6	6	VCC(+5V)
7	SD5	8	IRQ9
9	SD4	10	-5V
11	SD3	12	NC
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	SA19	28	SIOR
29	SA16	30	NC
31	SA15	32	NC
33	SA14	34	NC
35	SA13	36	NC
37	SA12	38	REFRESH
39	SA11	40	SYSCLK
41	SA10	42	IRQ7
43	SA9	44	IRQ6
45	SA8	46	IRQ5
47	SA7	48	NC
49	SA6	50	NC
51	SA5	52	NC
53	SA4	54	NC
55	SA3	56	BALE
57	SA2	58	VCC
59	SA1	60	OSC
61	SA0	62	GND
63	GND	64	GND

J22A: PC/104 Connector – 64 pin (For VEX2-6454-4C4NE/VEX2-6454-4C4EE)

Pin#	Single Name	Pin #	Single Name
1.	NC	2	GND
3	NC	4	NC
5	NC	6	VCC(+5V)
7	NC	8	NC
9	NC	10	-5V
11	NC	12	NC
13	NC	14	-12V
15	NC	16	NC
17	NC	18	+12V
19	NC	20	GND
21	NC	22	NC
23	NC	24	NC
25	NC	26	NC
27	NC	28	NC
29	NC	30	NC
31	NC	32	NC
33	NC	34	NC
35	NC	36	NC
37	NC	38	NC
39	NC	40	NC
41	NC	42	NC
43	NC	44	NC
45	NC	46	NC
47	NC	48	NC
49	NC	50	NC
51	NC	52	NC
53	NC	54	NC
55	NC	56	NC
57	NC	58	VCC
59	NC	60	NC
61	NC	62	GND
63	GND	64	GND

J22B: PC/104 Connector – 40 pin (For VEX2-6454-2C4IEE/VEX2-6450-2C3INE)

Pin#	Single Name	Pin #	Single Name
1.	GND	2	GND
3	SBHE	4	MEMCS16
5	LA23	6	IOCS16
7	LA22	8	NC
9	LA21	10	NC
11	LA20	12	IRQ12
13	LA19	14	IRQ15
15	LA18	16	IRQ14
17	LA17	18	NC
19	MEMR	20	NC
21	MEMW	22	NC
23	SD8	24	NC
25	SD9	26	NC
27	SD10	28	NC
29	SD11	30	NC
31	SD12	32	NC
33	SD13	34	VCC
35	SD14	36	MASTER
37	SD15	38	GND
39	NC	40	GND

J23: 4P Power Source (Interconnect to J22: PC/104)

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

J24: Power CONN.

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

J25: RESET

Pin#	Single Name
1	RESET-
2	GND

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.

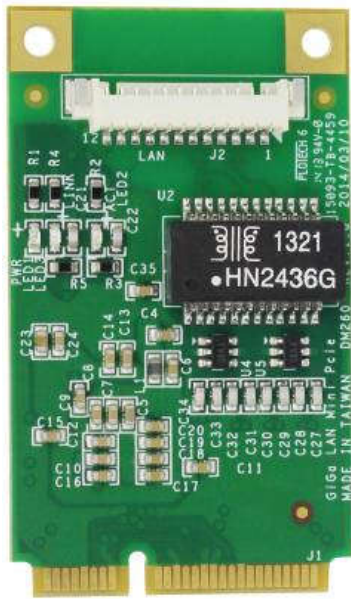
For details, please kindly visit the following link:

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

Appendix

MINIPCI-E-8111F

RTL8111F Mini PCI-E Gigabit LAN Module

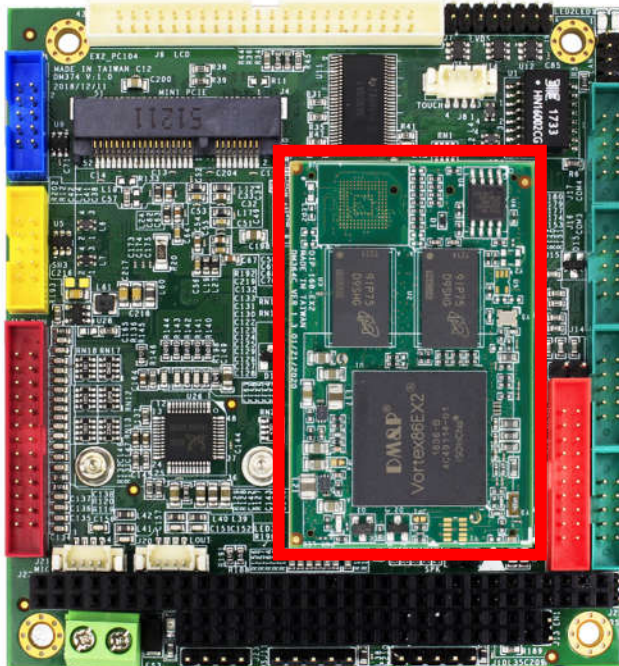


Pin#	Single Name
1	GTX+1
2	GTX-1
3	GRX+1
4	GTXC+1
5	GTXC-1
6	GRX-1
7	GRXD+1
8	GRXD-1
9	LED0+1
10	LED1+1
11	LED01
12	LED1/EESK1

MicroSD slot location

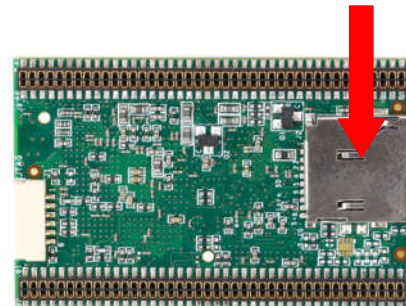
The MicroSD Card slot is located on the rad side of VEX2-DIP168 and in front of the LCD connector of PC/104 board.

Top:

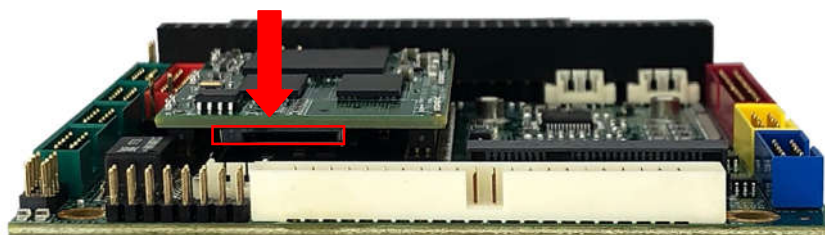


Bottom:

MicroSD slot



MicroSD slot



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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