User's Manual

VOX-070-TS-EX2C8-V

DMP Vortex86 EX2

Open Frame Panel PC with 7" TFT LCD and Touch Panels

(Revision V1.0)

REVISION

DATE	VERSION	DESCRIPTION
2023/05/11	Version 1.0	New Release

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Manual # IUMVOX-070-TS-EX2C8-V Ver. 1.0 May, 2023

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This Manual is for the VOX-070-TS-EX2C8-V.

SAFETY INFORMATION

- Read these Safety instructions carefully.
- Please carry the unit with both hands, handle carefully.
- Make sure the voltage of the power source is correct before connecting the equipment to the power outlet.
- Do not expose your Open Frame Panel PC to rain or moisture in order to prevent shock and fire hazard.
- Input voltage rated +12 ~ 24 VDC
- Operating temperature between 0~50°C / -20~+60°C (Option)/ -30~+80°C (Option).
- Keep VOX-070-TS-EX2C8-V away from humidity.
- When the SD Card is the main operating system storage, please turn off power before inserting or removing. Refer to your nearest dealer for qualified personnel servicing.
- Never touch un-insulated terminals or wire unless your power adaptor is disconnected.
- Locate your Open Frame Panel PC as close as possible to the socket outline for easy access and to avoid force caused by entangling of your arms with surrounding cables from the Open Frame Panel PC.
- USB connectors are not supplied with Limited Power Sources.
- If the equipment is not used for a long time, disconnect it from the power source to avoid damage by transient overvoltage.

WARNING!

DO NOT ATTEMPT TO DISASSEMBLE THE CPU Module or CHASSIS (ENCASING) OF THIS PRODUCT. PLEASE CONTACT YOUR DEALER FOR SERVICING FROM QUALIFIED TECHNICIAN.

Content

Ch. 1

General Information

1.1 Product Description

ICOP Technology Inc. is proudly going to release a brand new Panel PC, which offers fanless design and low power consumption. The VOX-070-TS-EX2C8-V is powered by DMP's Vortex86EX2, the x86 SoCs of Vortex86 family, and 1GB DDRIII chipset that handles processing more efficiently and provides faster performance. The high LED backlight TFT LCD increases operation convenience and visibility in outdoor environments. The ultra-compact and thin exterior design is perfect for the present demanding embedded and productive applications.

The new VOX-070-TS-EX2C8-V includes the versatile I/O ports, 10/100Mps Ethernet, and support WLAN, etc. can fulfill fundamental functions. Our consistent advantages feature stable performance, extended working temperature support, low power consumption and fanless design. The expandable customize I/O ports by MiniPCIe slots can be accommodated connectivity requirements to industrial machine platforms and industrial automation equipment's needs.

The VOX-070-TS-EX2C8-V supports Windows Embedded CE 6.0, Windows Embedded Compact 7 and Linux to meet ready-to-market demand and provide competitive advantages for customer.

1.2 Product Specifications

CPU BOARD SPECIFICATIONS

CPU	DM&P Vortex86EX2 Master CPU 600MHz (Optional Slave CPU 400MHz)
Cache	L1:16KB I-Cache, 16KB D-Cache L2: 128KB Cache
BIOS	Coreboot BIOS
Memory	1GB DDR3 onboard
Watchdog Timer	Software Programmable from 30.5u to 512 seconds x 2 sets
LAN	Integrated 10/100M Ethernet x 1
Audio	HD Audio-Realtek CODEC
Storage	SD Card x 2 (SDXC Support)
Expansion	MiniPCIe Slot x 2 **(MiniPCIe1 supports USB signals only with Micro SIM card holder and MiniPCIe2 supports PCIe and USB signals.)**
I/O	USB Ports (Ver2.0) x 3 8-bit GPIO x 1 RS-232 x 8 (Full 9pins x 9, RS232/485 x 2) CAN bus (2.0A / 2.0B) x 1 RJ-45 Port x 1 Speaker-out (L) x 1 Speaker-out (R) x 1 Mic-in x 1 I2C x 1 SPI x 1

MECHANICAL & ENVIRONMENT

Power Requirement	+12 ~ 24VDC Input
Power Consumption	7Watt (Typical)
Operating Temperature	0~50°C / -20~+60°C (Option)/ -30~+80°C (Option)
Storage Temperature	-30~+85°C
Operating Humidity	0% ~ 90% Relative Humidity, Non-Condensing
Dimensions	186 x 121.05 x 33.15mm
Weight	520g

LCD SPECIFICATIONS

Display Type	7” WVGA TFT LCD
Backlight Unit	LED
Display Resolution	800(W) x 480(H)
Brightness (cd/m^2)	400 nits
Contrast Ratio	500 : 1
Display Color	16.7M
Pixel Pitch (mm)	0.0642 (W) x 0.1790 (H)
Viewing Angle	Vertical 120^o, Horizontal 140^o
Backlight Lifetime	20,000 hrs

1.3 Inspection standard for TFT-LCD Panel

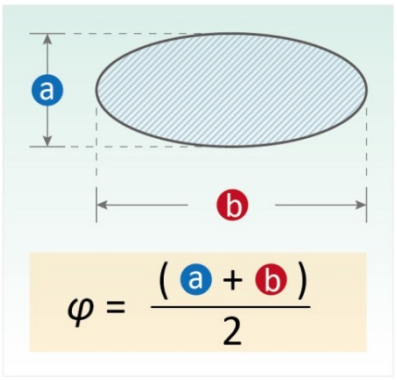
<table>
<tr><th colspan="3">DEFECT TYPE</th><th colspan="6">LIMIT</th><th>Note</th></tr>
<tr><td rowspan="9">VISUAL DEFECT</td><td rowspan="9">INTERNAL</td><td rowspan="3">SPOT</td><td colspan="3">φ＜0.15mm</td><td colspan="3">Ignore</td><td rowspan="3">Note1</td></tr>
<tr><td colspan="3">0.15mm≦φ≦0.5mm</td><td colspan="3">N≦4</td></tr>
<tr><td colspan="3">0.5mm＜φ</td><td colspan="3">N=0</td></tr>
<tr><td rowspan="2">FIBER</td><td colspan="3">0.03mm<W≦0.1mm, L≦5mm</td><td colspan="3">N≦3</td><td rowspan="2">Note1</td></tr>
<tr><td colspan="3">1.0mm＜W, 1.5mm＜L</td><td colspan="3">N=0</td></tr>
<tr><td rowspan="3">POLARIZER BUBBLE</td><td colspan="3">φ＜0.15mm</td><td colspan="3">Ignore</td><td rowspan="3">Note1</td></tr>
<tr><td colspan="3">0.15mm≦φ≦0.5mm</td><td colspan="3">N≦2</td></tr>
<tr><td colspan="3">0.5mm＜φ</td><td colspan="3">N=0</td></tr>
<tr><td>Mura</td><td colspan="6">It' OK if mura is slight visible through 6%ND filter</td><td></td></tr>
<tr><td rowspan="7">ELECTRICAL DEFECT</td><td colspan="2" rowspan="3">BRIGHT DOT</td><td colspan="3">A Grade</td><td colspan="3">B Grade</td><td></td></tr>
<tr><td>C Area</td><td>O Area</td><td>Total</td><td>C Area</td><td>O Area</td><td>Total</td><td>Note3</td></tr>
<tr><td>N≦0</td><td>N≦2</td><td>N≦2</td><td>N≦2</td><td>N≦3</td><td>N≦5</td><td>Note2</td></tr>
<tr><td colspan="2">DARK DOT</td><td>N≦2</td><td>N≦3</td><td>N≦3</td><td>N≦3</td><td>N≦5</td><td>N≦8</td><td></td></tr>
<tr><td colspan="2">TOTAL DOT</td><td colspan="3">N≦4</td><td>N≦5</td><td>N≦6</td><td>N≦8</td><td>Note2</td></tr>
<tr><td colspan="2">TWO ADJACENT DOT</td><td>N≦0</td><td>N≦1 pair</td><td>N≦1 pair</td><td>N≦1 pair</td><td>N≦1 pair</td><td>N≦1 pair</td><td>Note4</td></tr>
<tr><td colspan="2">THREE OR MORE ADJACENT DOT</td><td colspan="6">NOT ALLOWED</td><td></td></tr>
<tr><td colspan="2">LINE DEFECT</td><td colspan="6">NOT ALLOWED</td><td></td></tr>
</table>

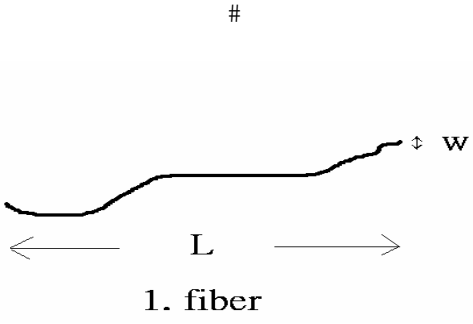
(1) One pixel consists of 3 sub-pixels, including R, G, and B dot. (Sub-pixel = Dot)

(2) Little bright Dot acceptitable under 6% ND-Filter.

(3) If require G0 grand (Total dot N≦0), please contact region sales.

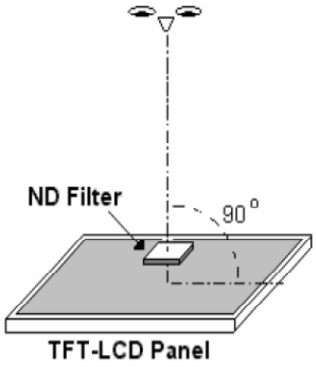
[Note 1] W: Width[mm]; L: Length[mm]; N: Number; φ: Average Diameter.

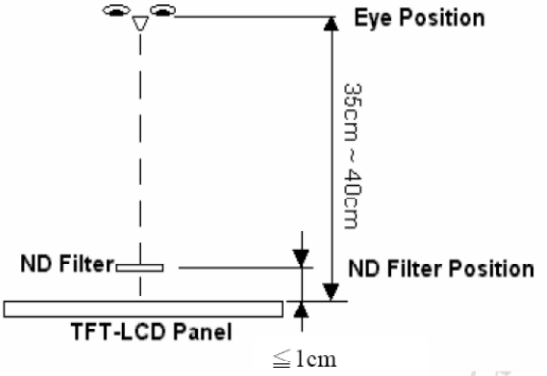




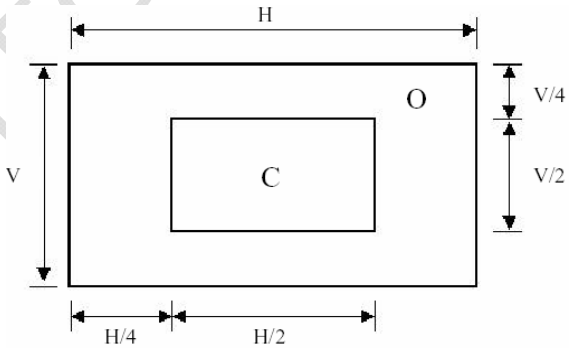
(a) White / Black Spot (b) Polarizer Bubble

[Note 2] Bright dot is defined through 6% transmission ND Filter as following.



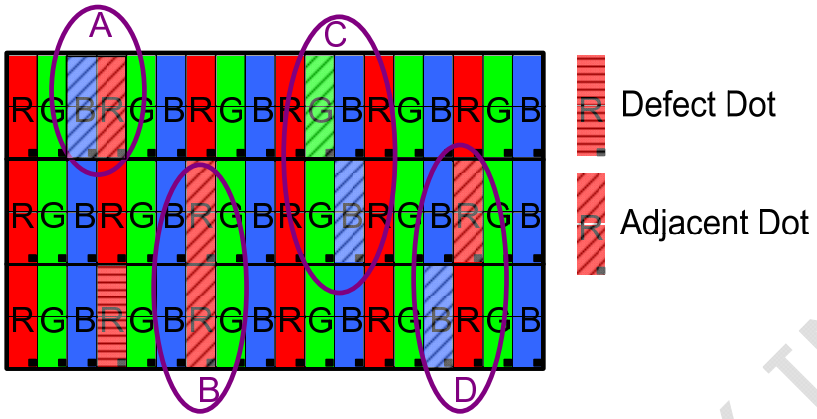


[Note 3] Display area



C Area: Center of display area **O Area**: Outer of display area

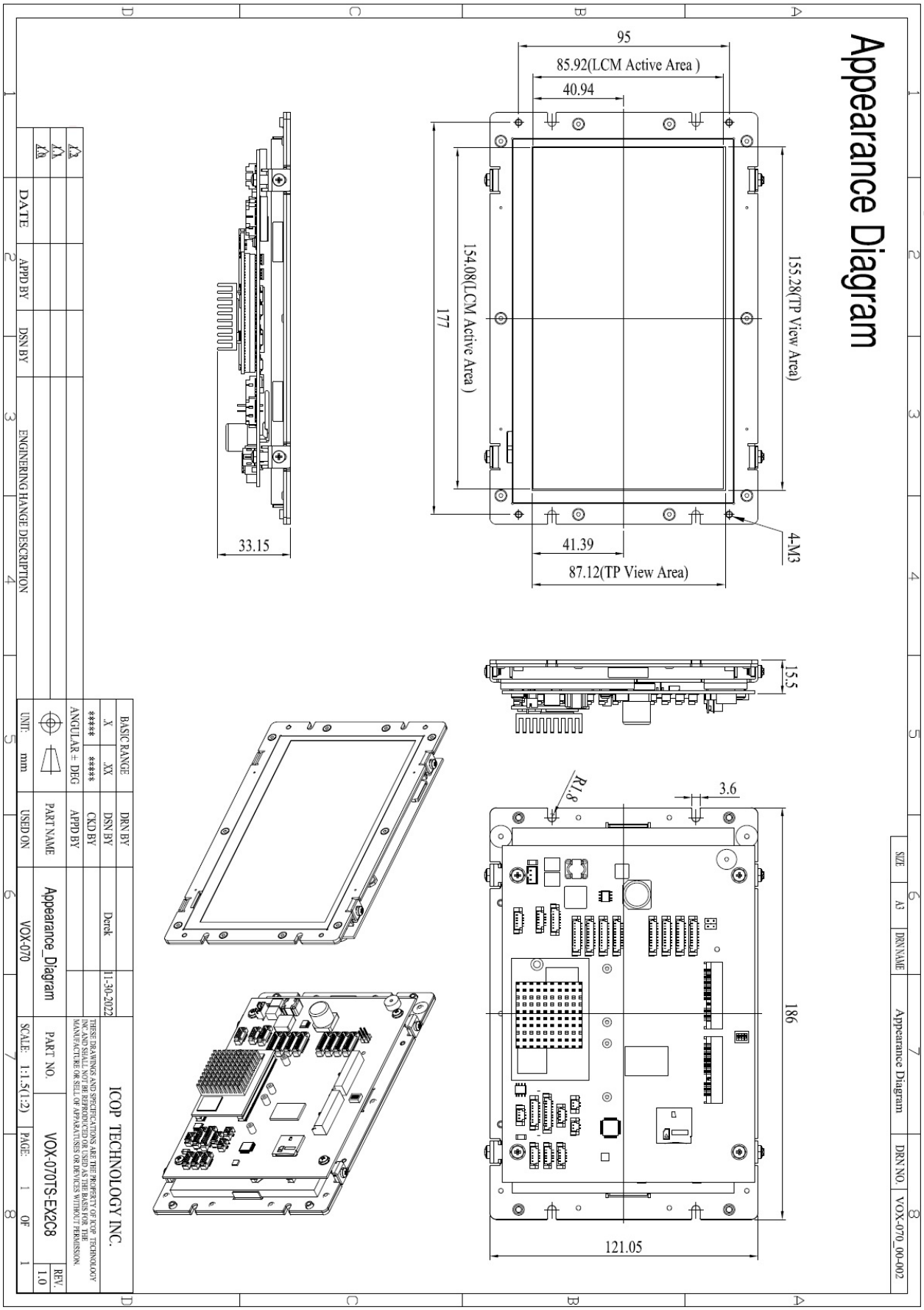
[Note 4] Judge the defect dot and the adjacent dot as following. Allow below (as A, B, C and D status) adjacent defect dots, including bright and dark adjacent dot. And they will be counted 2 defect dots in total quantity.



The defects that are not defined above and considered to be problem shall be reviewed and discussed by both parties.

Defects on the Black Matrix, out of Display area, are not considered as a defect or counted.

1.4 Product Dimensions



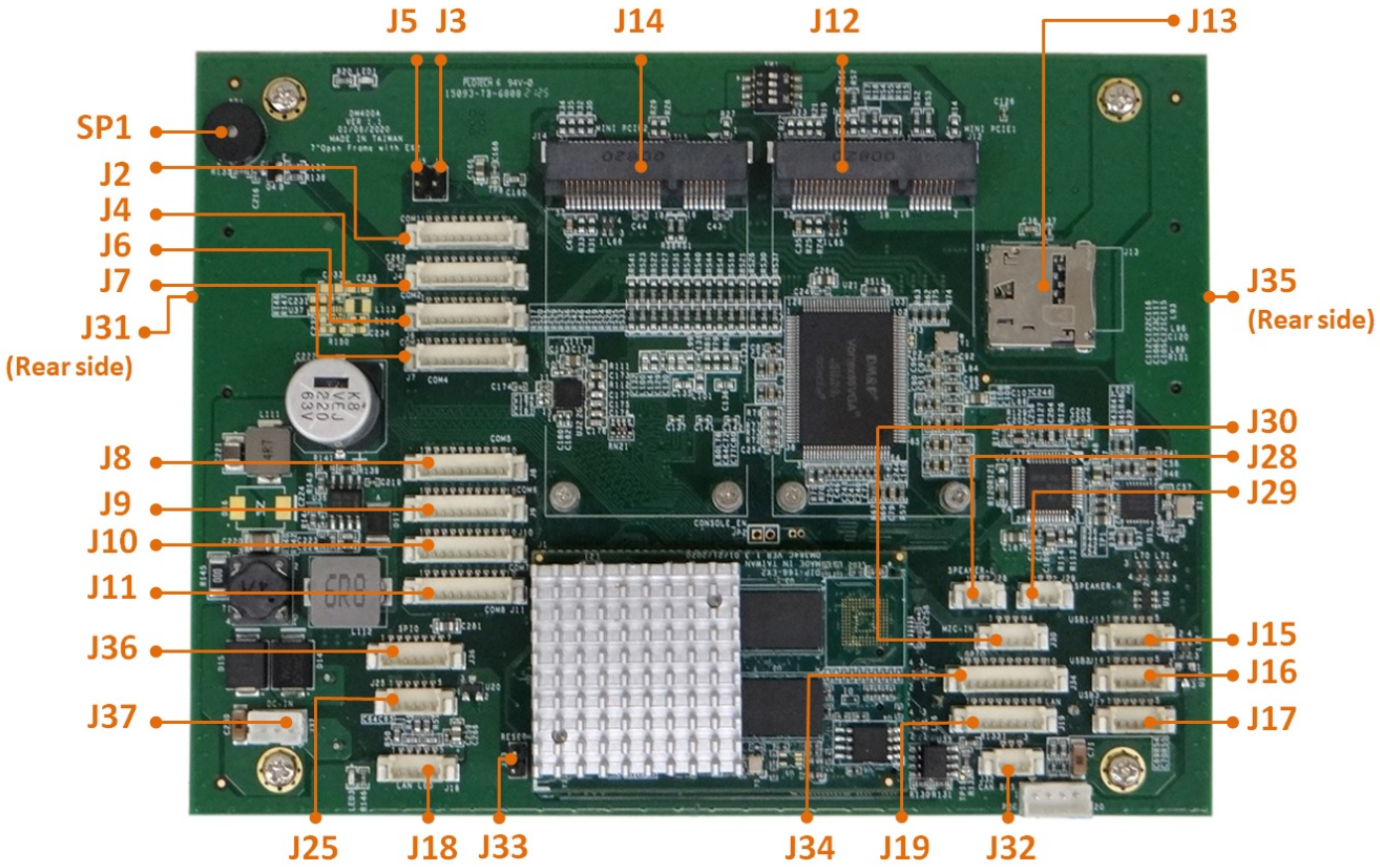
1.5 Ordering Information

PART NUMBER	DESCRIPTION
VOX-070-TS-EX2C8-V	7” EX2 OP w/1GB DRAM/8GB eMMC SLC/3U/8S /CAN/GPIO/LAN/I2C/SPI/2MiniPCIe/SPK-OUT/SD /MIC-IN/GPU-A9160/+12~24Vdc Power Input
CABLE-400OP-SET	Cable set for VOX-070-TS-EX2C8-V Series

Ch. 2

System Installation

2.1 CPU Board Outline



CPU Board

2.2 Connector Summary

No.	Description	Type of Connections	Pin #
J2	COM1	1.25mm 8-pin wafer	8-pin
J3	COM1 RS232/485 Selection	2.54mm 2-pin header	2-pin
J4	COM2	1.25mm 8-pin wafer	8-pin
J5	COM2 RS232/485 Selection	2.54mm 2-pin header	2-pin
J6	COM3	1.25mm 8-pin wafer	8-pin
J7	COM4	1.25mm 8-pin wafer	8-pin
J8	COM5	1.25mm 8-pin wafer	8-pin
J9	COM6	1.25mm 8-pin wafer	8-pin
J10	COM7	1.25mm 8-pin wafer	8-pin
J11	COM8	1.25mm 8-pin wafer	8-pin
J12	MiniPCIe1	MiniPCIe Slot	52-pin
J13	Micro SIM Card Holder **(For MiniPCIe1 only)**	Micro SIM Card Holder for MiniPCIe1	6-pin
J14	MiniPCIe2	MiniPCIe Slot	52-pin
J15	USB1	1.25mm 5-pin wafer	5-pin
J16	USB2	1.25mm 5-pin wafer	5-pin
J17	USB3	1.25mm 5-pin wafer	5-pin
J18	Power & LAN LEDs	1.25mm 5-pin wafer	5-pin
J19	Ethernet	1.25mm 8-pin wafer	8-pin
J25	I2C	1.25mm 5-pin wafer	5-pin
J28	SPK-L	1.25mm 2-pin wafer	2-pin
J29	SPK-R	1.25mm 2-pin wafer	2-pin

J30	MIC-IN	1.25mm 4-pin wafer	4-pin
J31	SD Card Slot #1	External SD Card Socket #2	13-pin
J32	CAN Bus	1.25mm 3-pin wafer	3-pin
J33	Hardware Reset	2.54mm 2-pin header	2-pin
J34	GPIO	1.25mm 10-pin wafer	10-pin
J35	SD Card Slot #2	External SD Card Socket #2	13-pin
J36	SPI Bus	1.25mm 7-pin wafer	7-pin
J37	Power Input Connector	2.00mm 3-pin wafer	3-pin

2.3 Connector Pin Assignments

J2 & J4: COM1 & 2 (RS232/RS485/TTL)

Pin #	Signal Name	Pin #	Signal Name
1	GND	2	RI
3	DTR	4	CTS
5	TXD	6	RTS
7	RXD / RS485+	8	DSR
9	DCD / RS485-	10	VCC (+5V)

J6,J7,J8,J9,J10,J11: COM3,4,5,6,7,8 (RS232/TTL)

Pin #	Signal Name	Pin #	Signal Name
1	GND	2	RI
3	DTR	4	CTS
5	TXD	6	RTS
7	RXD	8	DSR
9	DCD	10	VCC (+5V)

J3: COM1 RS232/RS485 Selection

Pin #	Signal Name
Open	RS232
Close	RS485

J5: COM2 RS232/RS485 Selection

Pin #	Signal Name
Open	RS232
Close	RS485

J12: MiniPCIe1 Socket

Pin #	Signal Name	Pin #	Signal Name
1	N/A	2	+3.3V
3	Reserved / +5V Power-out	4	GND
5	Reserved / +5V Power-out	6	N/A
7	N/A	8	**SIM-VCC**
9	GND	10	**SIM-IO**
11	N/A	12	**SIM-CLK**
13	N/A	14	**SIM-RST**
15	GND	16	**SIM-VPP**
Mechanical Key			
17	Reserved / RI	18	GND
19	Reserved / DTR	20	N/A
21	GND	22	PERST#
23	N/A	24	+3.3V
25	N/A	26	GND
27	GND	28	N/A
29	GND	30	N/A
31	N/A	32	N/A
33	N/A	34	GND
35	GND	36	USB_D-
37	GND	38	USB_D+
39	+3.3V	40	GND
41	+3.3V	42	**LED_WWAN#**
43	GND	44	Reserved / DCD
45	Reserved / CTS	46	Reserved / DSR
47	Reserved / RTS	48	N/A
49	Reserved / RXD	50	GND
51	Reserved / TXD	52	+3.3V

J13: Micro SIM Card Holder

Pin #	Signal Name	Pin #	Signal Name
1	SIM-VCC	2	SIM-RST
3	SIM-CLK	4	GND
5	SIM-VPP	6	SIM-IO

J14: MiniPCIe1 Socket

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

J15, J16 & J17: USB1,2,3

Pin #	Signal Name	Pin #	Signal Name
1	VCC	2	USBD-
3	USBD+	4	GND
5	FGND		

J18: Power & LAN LEDs

Pin #	Signal Name	Pin #	Signal Name
1	+3.3V	2	GND
3	LINK	4	ACTIVE
5	+3.3V		

J19: Ethernet

Pin #	Signal Name	Pin #	Signal Name
1	LTX+	2	LTX-
3	LRX+	4	LRX-
5	N/A	6	N/A
7	N/A	8	N/A

J25: I2C Bus

Pin #	Signal Name	Pin #	Signal Name
1	+5V	2	GND
3	I2C_SCL	4	I2C_SDA
5	+3.3V		

J28: SPK-L

Pin #	Signal Name	Pin #	Signal Name
1	LOUT+	2	LOUT-

J29: SPK-R

Pin #	Signal Name	Pin #	Signal Name
1	ROUT+	2	ROUT-

J30: MIC-IN

Pin #	Signal Name	Pin #	Signal Name
1	MIC-IN_R	2	GND_AUD
3	GND_AUD	4	MIC-IN_L

J32: CAN Bus

Pin #	Signal Name	Pin #	Signal Name
1	CAN_H	2	CAN_L
3	GND		

J33: Reset (Hardware)

Pin #	Signal Name
Open	Board Working
Shorted	Hardware Reset

J34: GPIO

Pin #	Signal Name	Pin #	Signal Name
1	GND	2	GP10
3	GP11	4	GP12
5	GP13	6	GP14
7	GP15	8	GP16
9	GP17	10	+5V

J31 & J35: SD Card Slot

Pin #	Signal Name	Pin #	Signal Name
1	DAT3	2	CMD
3	GND	4	VDD
5	CLK	6	GND
7	DAT0	8	DAT1
9	DAT2	10	Card Detect
11	Write Protect	12	GND
13	GND		

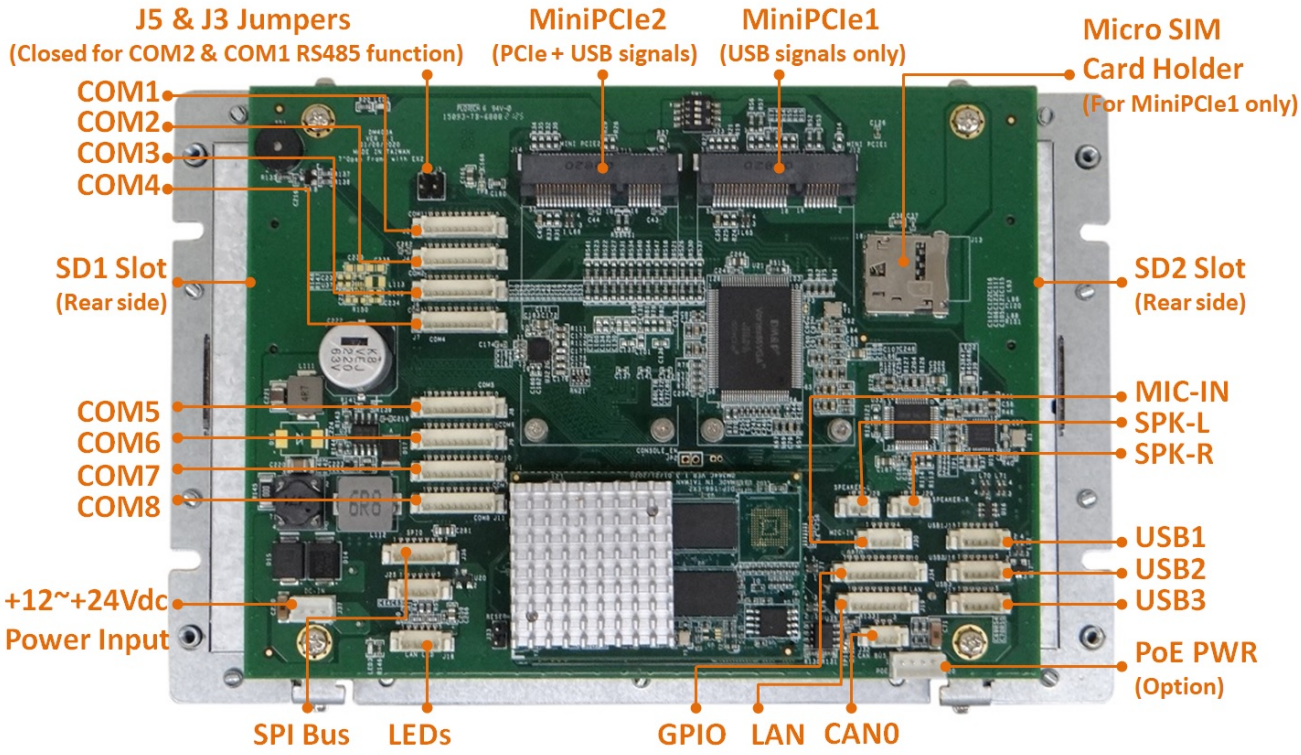
J36: SPI Bus

Pin #	Signal Name	Pin #	Signal Name
1	GND	2	SPI_CS1
3	SPI_CS2	4	SPI_CLK
5	SPI_DO	6	SPI_DI
7	+5V		

J37: Power Input Connector (+12~36Vdc support)

Pin #	Signal Name
1	VIN+
2	VIN-
3	FGND

2.4 External I/O Overview



NOTE

1. MiniPCIe1 Socket supports USB signals only.
2. MiniPCIe2 Socket supports PCIe and USB signals.
3. Micro SIM Card Holder is only for MiniPCI1 slot.
4. The RS232/485 functions of COM1 and COM2 are selected by J3 & J5 headers.

2.5 I/O Mapping

VOX-070-TS-EX2C8-V series comes with 8 COM ports, GPIO and CAN0. Please refer the IO mapping as below table.

Function	Connector	Address	IRQ	Multi-Function Port of EX2
COM1	J2	3F8h	4	Port 2
COM2	J4	2F8h	3	Port 6
COM3	J6	3E8h	4	Port 8
COM4	J7	2E8h	3	Port 9
COM5	J8	360h	4	Port A
COM6	J9	260h	3	Port B
COM7	J10	368h	4	Port C
COM8	J11	268h	3	Port D
GPIO	J34	78h (data) 98h (dir)		Port 1
CAN0	J32		7	Bit 0 and 1 of Port 4

2.6 Watchdog Timer

There are two watchdog timers in Vortex86EX2 processor, we also provide DOS, Linux and WinCE example for your reference. Please contact ICOP for more detail information.

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.