



User's Manual

VOX-070-TS-EX2 Series

DMP Vortex86 EX2

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

(Revision V1.0)

REVISION

DATE	VERSION	DESCRIPTION
2019/05/31	Version 1.0	New Release

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Manual # IUMVOX-070-TS-EX2-01 Ver. 1.0 May, 2019

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This Manual is for the VOX-070-TS-EX2 series.

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 ~ 36 VDC
- Operating temperature between 0~+50°C (+32~+122°F) / -20~+60°C (-4~+140°F) / -30~+80°C (-22~176°F).
- Keep VOX-070-TS-EX2 away from humidity.
- When a SD Card or internal eMMC 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.

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Ch. 1

General Information

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[1.2 Product Specifications](#)

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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, and IP65 front panel. The VOX-070-TS-EX2 series are powered by DMP's latest Vortex86EX2, the 3rd generation SoCs of Vortex86 family, and dual-channel 1GB / 2GB DDRIII chipset that handles processing more efficiently and provides faster performance. The resistive touch panel with 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-EX2 includes the versatile I/O ports, 10/100Mbps 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 MiniPCle slots can be accommodated connectivity requirements to industrial machine platforms and industrial automation equipment's needs.

The VOX-070-TS-EX2 supports Windows Embedded CE 6.0, Windows Embedded Compact 7, Windows Embedded Standard 2009 and Linux to meet ready-to-market demand and provide competitive advantages for customers.

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 / 2GB DDR3 onboard
Watchdog Timer	Software Programmable from 30.5u to 512 seconds x 2 sets
LAN	Integrated 10/100M Ethernet x 1
PoE (Optional by external MiniPCle module)	Optional upon 10/100Mbps Ethernet x 1 Support IEEE 802.3AF, PoE/PD
Audio	HD Audio-Realtek ALC262 CODEC
Internal Drives	SD Slot / eMMC-4GB / eMMC-8GB (Optional)
Expansion	MiniPCle Slot x 4 (SIM card holder support on MiniPCle1)
I/O	USB Ports (Ver2.0) x 4 8-bit GPIO RS-232 x 5 (Full 9pins x 2, RS232/485 x 3) 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

MECHANICAL & ENVIRONMENT

Power Requirement	+12 ~ 36VDC Input
Power Consumption	7Watt (Typical)
Operating Temperature	0~+50°C (+32~+122°F) / -20~+60°C (-4~+140°F; Optional) / -30~+80°C (-22~+176°F; Optional)
Storage Temperature	-30~+85°C (-22~ +185°F)
Operating Humidity	0% ~ 90% Relative Humidity, Non-Condensing
Dimensions	186x121.05x28.7mm (73.23"x47.66"x11.30")
Weight	485g

LCD SPECIFICATIONS

Display Type	7" WVGA TFT LCD
Backlight Unit	LED
Display Resolution	800(W) x 480(H)
Brightness (cd/m ²)	400 nits / 1,000 nits (Optional)
Contrast Ratio	800 : 1
Display Color	16.7M
Pixel Pitch (mm)	0.1926 (H) x 0.179 (V)
Viewing Angle	Vertical 130°, Horizontal 160°
Backlight Lifetime	20,000 hrs

TOUCHSCREEN

Type	Analog Resistive
Resolution	Continuous
Transmittance	80%
Controller	PS/2 interface
Software Driver	Linux, Win CE, Win XP, Win 7, Windows Embedded Standard
Durability	1 million

1.3 Inspection standard for TFT-LCD Panel

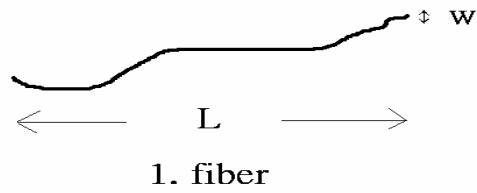
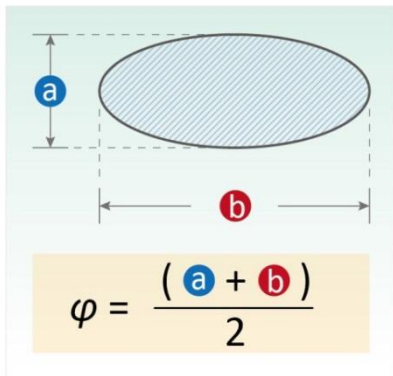
DEFECT TYPE			LIMIT				Note	
VISUAL DEFECT	INTERNAL	SPOT	$\phi < 0.15\text{mm}$		Ignore		Note1	
			$0.15\text{mm} \leq \phi \leq 0.5\text{mm}$		$N \leq 4$			
			$0.5\text{mm} < \phi$		N=0			
		FIBER	$0.03\text{mm} < W \leq 0.1\text{mm}, L \leq 5\text{mm}$		$N \leq 3$		Note1	
			$1.0\text{mm} < W, 1.5\text{mm} < L$		N=0			
		POLARIZER BUBBLE	$\phi < 0.15\text{mm}$		Ignore		Note1	
			$0.15\text{mm} \leq \phi \leq 0.5\text{mm}$		$N \leq 2$			
			$0.5\text{mm} < \phi$		N=0			
		Mura	It' OK if mura is slight visible through 6%ND filter					
		ELECTRICAL DEFECT	BRIGHT DOT	A Grade			B Grade	
C Area	O Area			Total	C Area	O Area	Total	Note3
$N \leq 0$	$N \leq 2$			$N \leq 2$	$N \leq 2$	$N \leq 3$	$N \leq 5$	Note2
DARK DOT	$N \leq 2$		$N \leq 3$	$N \leq 3$	$N \leq 3$	$N \leq 5$	$N \leq 8$	
TOTAL DOT	$N \leq 4$			$N \leq 5$	$N \leq 6$	$N \leq 8$	Note2	
TWO ADJACENT DOT	$N \leq 0$		$N \leq 1$ pair	$N \leq 1$ pair	$N \leq 1$ pair	$N \leq 1$ pair	$N \leq 1$ pair	Note4
THREE OR MORE ADJACENT DOT	NOT ALLOWED							
LINE DEFECT	NOT ALLOWED							

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

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

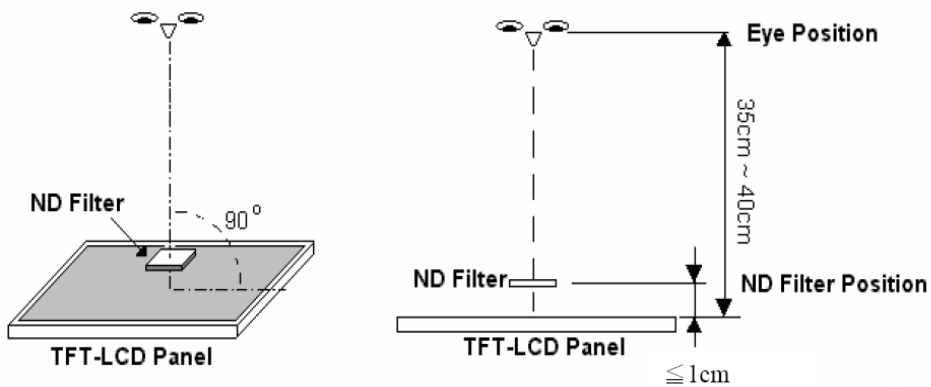
(3) If require G0 grand (Total dot $N \leq 0$), please contact region sales.

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

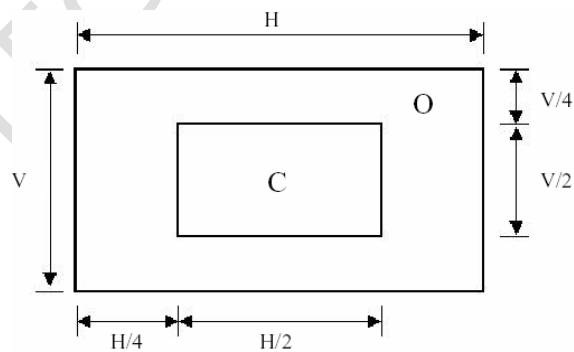


(a) White / Black Spot (b) Polarizer Bubble

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

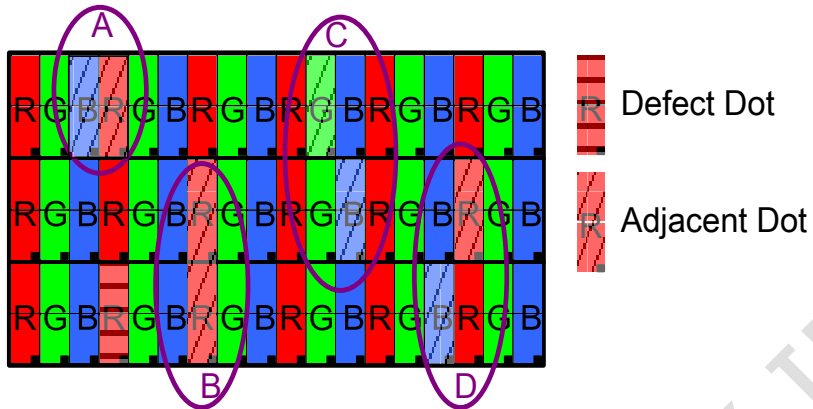


[Note 3] Display area



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.

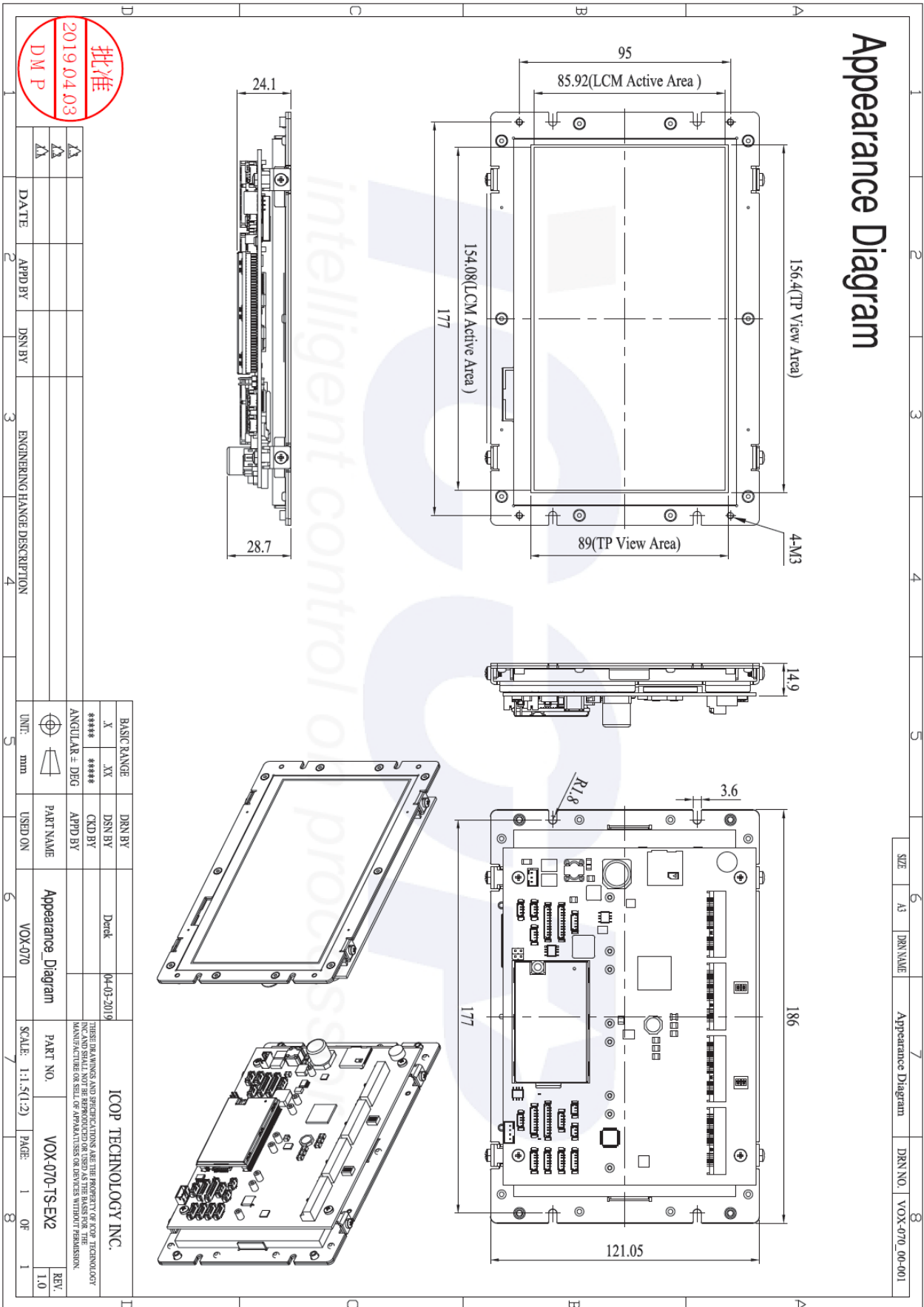


The defects that are not defined above and considered to be problem shall be reviewed and discussed by both parties.

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

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1.4 Product Dimensions



1.5 Ordering Information

PART NUMBER	DESCRIPTION
VOX-070-TS-EX2	7" EX2 OP w/1GB/4U/5S/CAN/GPIO/LAN/4 MiniPCIe/SPK-OUT/MIC-IN/SD Card
VOX-070-TS-EX2-V	7" EX2 OP w/1GB/4U/5S/CAN/GPIO/LAN/4 MiniPCIe/SPK-OUT/MIC-IN/SD Card/GPU-A9160
VOX-070-TS-EX2-E4	7" EX2 OP w/1GB/4U/5S/CAN/GPIO/LAN/4 MiniPCIe/SPK-OUT/MIC-IN/4GB eMMC
VOX-070-TS-EX2-VE4	7" EX2 OP w/1GB/4U/5S/CAN/GPIO/LAN/4 MiniPCIe/SPK-OUT/MIC-IN/4GB eMMC/GPU-A9160
VOX-070-TS-EX2-2G	7" EX2 OP w/2GB/4U/5S/CAN/GPIO/LAN/4 MiniPCIe/SPK-OUT/MIC-IN/SD Card
VOX-070-TS-EX2-V-2G	7" EX2 OP w/2GB/4U/5S/CAN/GPIO/LAN/4 MiniPCIe/SPK-OUT/MIC-IN/SD Card/GPU-A9160
VOX-070-TS-EX2-E4-2G	7" EX2 OP w/2GB/4U/5S/CAN/GPIO/LAN/4 MiniPCIe/SPK-OUT/MIC-IN/4GB eMMC
VOX-070-TS-EX2-VE4-2G	7" EX2 OP w/2GB/4U/5S/CAN/GPIO/LAN/4 MiniPCIe/SPK-OUT/MIC-IN/4GB eMMC/GPU-A9160
CABLE-379OP-SET	Cable set for VOX-070-TS-EX2 series
★ Please contact your region sales for more ordering part numbers.	

Ch. 2

System Installation

[2.1 CPU Board Outline](#)

[2.2 Connector Summary](#)

[2.3 Connector Pin Assignments](#)

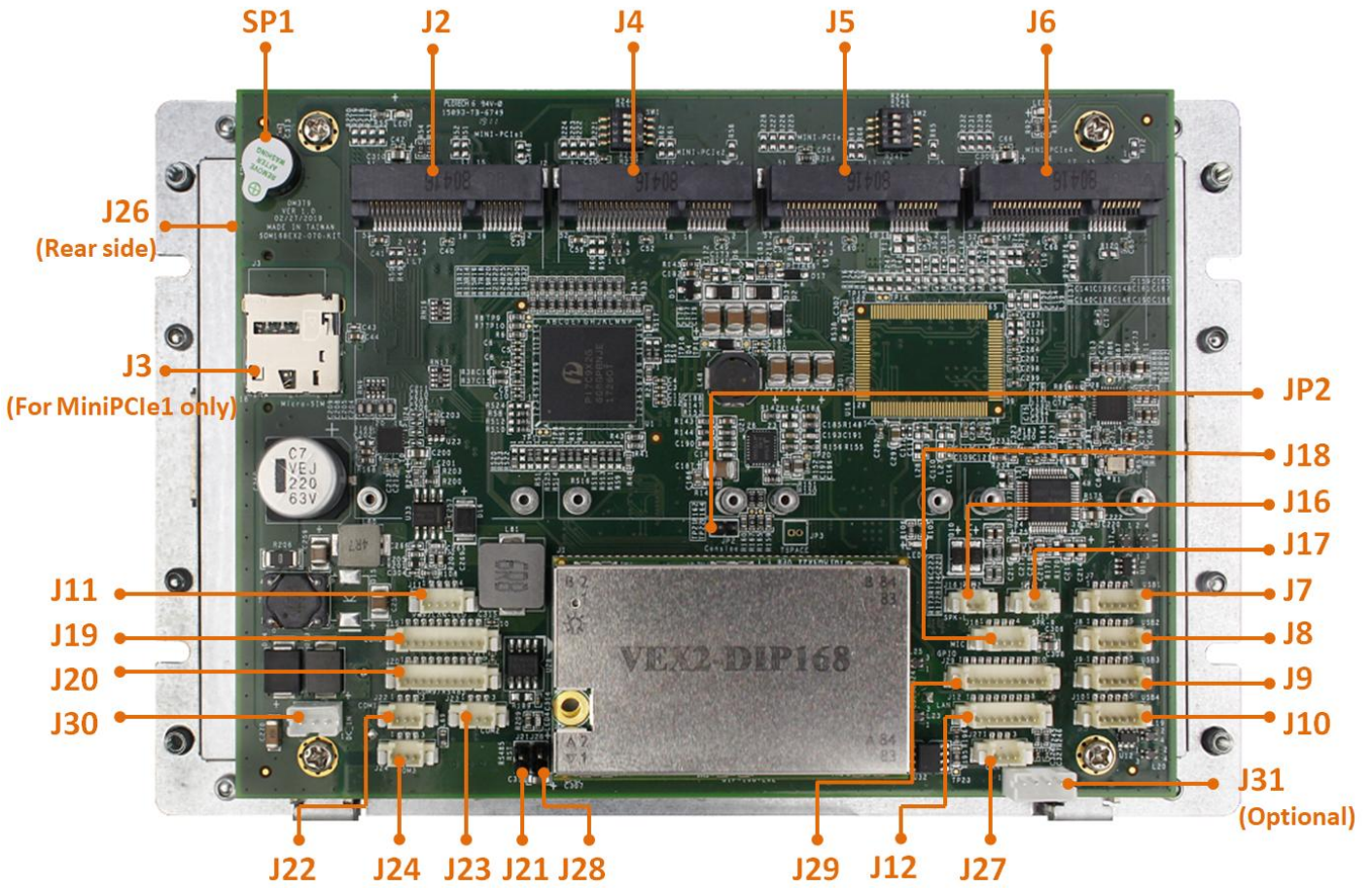
[2.4 External I/O Overview](#)

[2.5 External I/O Pin Assignment](#)

[2.6 Watchdog Timer](#)

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2.1 CPU Board Outline



CPU Board

2.2 Connector Summary

No.	Description	Type of Connections	Pin #
J2	MiniPCle1	MiniPCle Slot	52-pin
J3	Micro SIM Card Holder	Micro SIM Card Holder for MiniPCle1	6-pin
J4	MiniPCle2	MiniPCle Slot	52-pin
J5	MiniPCle3	MiniPCle Slot	52-pin
J6	MiniPCle4	MiniPCle Slot	52-pin
J7	USB1	1.25mm 5-pin wafer	5-pin
J8	USB2	1.25mm 5-pin wafer	5-pin
J9	USB3	1.25mm 5-pin wafer	5-pin
J10	USB4	1.25mm 5-pin wafer	5-pin
J11	Power & LAN LEDs	2.0mm 3-pin wafer	8-pin
J12	Ethernet	1.25mm 8-pin wafer	8-pin
J16	SPK-L	1.25mm 2-pin wafer	2-pin
J17	SPK-R	1.25mm 2-pin wafer	2-pin
J18	MIC-IN	1.25mm 4-pin wafer	4-pin
J19	COM8	1.25mm 8-pin wafer	8-pin
J20	COM9	1.25mm 8-pin wafer	8-pin
J21	COM9 RS232/485 Selection	1.25mm 2-pin header	2-pin
J22	COM1	1.25mm 3-pin header	3-pin
J23	COM2	1.25mm 3-pin header	3-pin
J24	COM3	1.25mm 3-pin header	3-pin
J26	SD Card Slot (Optional)	Internal SD Card Socket	
J27	CAN0	1.25mm 3-pin header	3-pin

J28	Reset (Hardware)	1.25mm 2-pin header	2-pin
J29	GPIO	1.25mm 10-pin wafer	10-pin
J30	Power Input Connector	2.00mm 3-pin wafer	3-pin
J31	PoE (Optional)	2.00mm 4-pin wafer	4-pin

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2.3 Connector Pin

Assignments

J2, J4, J5 & J6: MiniPCle1,2,3&4 Slots

Pin #	Signal Name	Pin #	Signal Name
1	WAKE#	2	+3.3V
3	Reserved / +5V Power-out	4	GND
5	Reserved / +5V Power-out	6	NC
7	N/C	8	SIM-VCC
9	GND	10	SIM-IO
11	REFCLK-	12	SIM-CLK
13	REFCLK+	14	SIM-RST
15	GND	16	SIM-VPP
Mechanical Key			
17	Reserved / RI	18	GND
19	Reserved / DTR	20	NC
21	GND	22	PERST#
23	PERn0	24	+3.3V
25	PERp0	26	GND
27	GND	28	NC
29	GND	30	NC
31	PETn0	32	NC
33	PETp0	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	NC
49	Reserved / RXD	50	GND
51	Reserved / TXD	52	+3.3V

★Pin8, 10, 12, 14, 16 & 42 are only for MiniPCle1.

J3: Micro SIM Card Holder

(For MiniPCle1 only)

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

J7, J8, J9 & J10: USB1,2,3&4

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

J11: Power & LAN LEDs

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

J12: Ethernet

Pin #	Signal Name	Pin #	Signal Name
1	LTX+	2	LTX-
3	LRX+	4	LRX-
5	NC / SP1	6	NC / SP1
7	NC / SP2	8	NC / SP2

J16: SPK-L

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

J17: SPK-R

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

J18: MIC-IN

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

J19: COM8 (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)

J20: COM9 (RS232/485/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)

★RS485 function must be having a jumper by J21.

J21: COM9 RS232/485 Selection

Pin #	Signal Name
Open	Enable RS232
Close	Enable RS485

J22, J23 & J24: COM1,2&3

Pin #	Signal Name	Pin #	Signal Name
1	TXD	2	RXD
3	GND		

J26: SD Card Slot (Optional)

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		

J27: CAN0

Pin #	Signal Name	Pin #	Signal Name
1	CAN0_N	2	CAN0_L
3	GND		

J28: Reset (Hardware)

Pin #	Signal Name
Open	Board Working
Shorted	Hardware Reset

J29: GPIO

Pin #	Signal Name	Pin #	Signal Name
1	GND	2	GP00
3	GP01	4	GP02
5	GP03	6	GP04
7	GP05	8	GP06
9	GP07	10	+3.3V

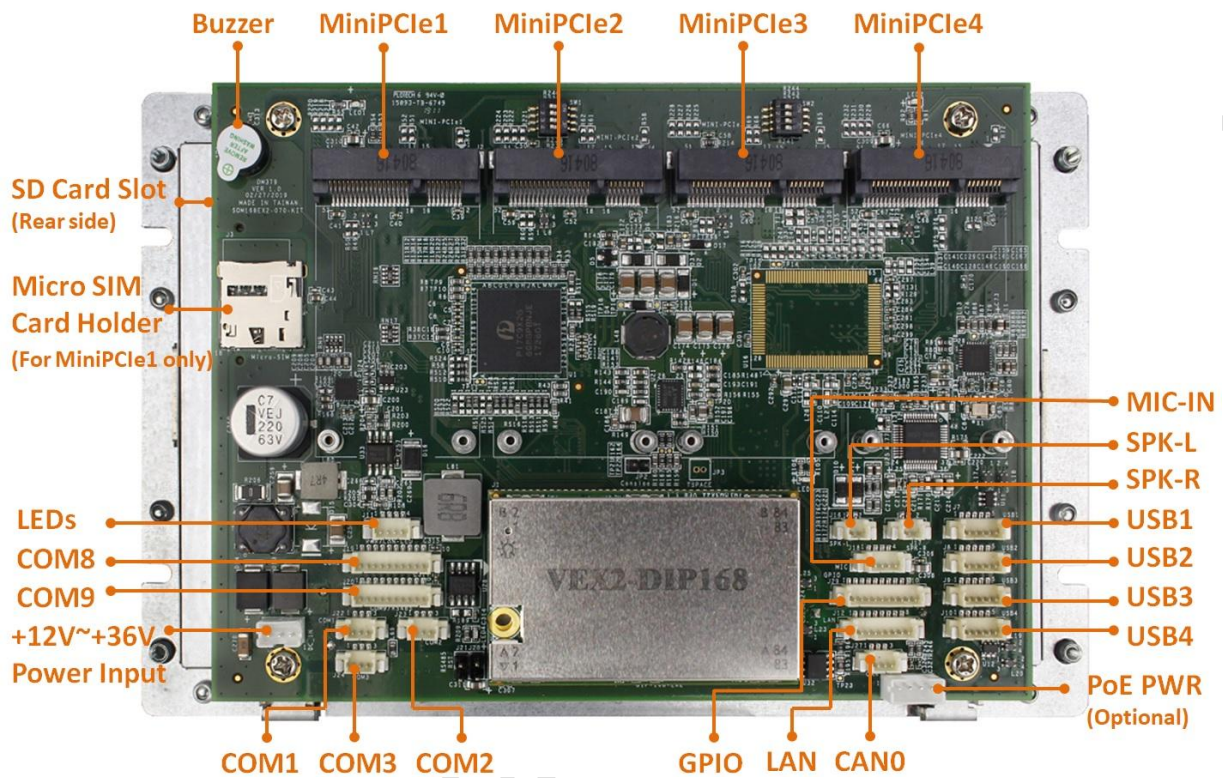
J30: Power Input Connector (+12~36Vdc support)

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

J31: PoE (Optional)

Pin #	Signal Name	Pin #	Signal Name
1	SP1	2	SP2
3	SP3	4	SP4

2.4 External I/O Overview



NOTE

1. Micro SIM Card Holder is only for MiniPCI1 slot.
2. The RS232/485 function of COM9 is selected by J21 header.
3. PoE PWR connector is optional for external MiniPCle PoE module.

2.5 I/O Mapping

VOX-070-TS-EX2 series comes with maximum 9 COM ports, GPIO and CAN0. Please refer the IO mapping as below table.

Function	Connector	Address	IRQ	Multi-Function Port of EX2
COM1	J22	3F8h	4	Bit0 & 1 of Port 5
COM2	J23	2F8h	3	Bit2 * 3 of Port 5
COM3	J24	3E8h	10	Bit4 & 5 of Port 5
COM4 (Reserved)	MiniPCle1	2E8h	11	Port 8
COM5 (Reserved)	MiniPCle2	360h	4	Port 6
COM6 (Reserved)	MiniPCle3	260h	3	Port 2
COM7 (Reserved)	MiniPCle4	368h	10	Port 1
COM8	J19	268h	11	Port 9
COM9	J20	3E0h	4	Port A
GPIO	J29	78h (data) 98h (dir)		Port 0
CAN0	J27		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.

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