



## **User's Manual**

# **HMI-043T Open Frame**

DMP Vortex86 EXm Processor

Compact Panel PC with 4.3" Touchscreen

HMI-043T-EM41N-O

HMI-043T-EM41B-O

## REVISION

DATE	VERSION	DESCRIPTION
2014/7/31	Version 1.0A	New Release

## 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 Panel PC to rain or moisture in order to prevent shock and fire hazard.
- Input voltage rated +5VDC (HMI-043T Open Frame Series)
- Operating temperature between -20~+60°C (-4F~+140°F).
- Keep HMI-043T away from humidity.
- Never touch un-insulated terminals or wire unless your power adaptor is disconnected.
- Locate your 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 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 OPEN OR TO DISASSEMBLE THE 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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# 1.1 Product Description

ICOP Technology Inc. is proudly going to release a brand new HMI, which offers fanless design, low power consumption, and IP65 front panel. The HMI-043T is powered by DMP Vortex86Exm SoC, the new generation SoC of Vortex86 family, which is included 128MB/256MB memory and eMMC Flash memory. 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 HMI-043T inherited PDX/PMX-series' smooth appearance and ultra-texture aluminum exterior design to make your industrial applications look more stylish. The versatile I/O ports, 10/100Mps Ethernet, RS/232/485 , GPIO and Can bus etc. can fulfill fundamental functions. Our consistent advantages feature stable performance, extended working temperature support, low power consumption and fanless design. The open frame model can be accommodated connectivity requirements to industrial machine platforms and industrial automation equipment's needs.

HMI-043T is not only supporting DOS, Linux, and Windows Embedded CE, but also compatible with Arduino platform, which is an open-source electronics prototyping platform based on flexible, easy to use hardware and software to meet ready-to-market demand and provide competitive advantages for customers.

# 1.2 Product Specifications

## CPU BOARD SPECIFICATIONS

CPU	DMP Vortex86Exm 400MHz
BIOS	Coreboot BIOS
Cache	L1:16KB I-Cache, 16KB D-Cache L2: 4-way, 128KB L2 Cache
Memory	128MB / 256MB DDRIII onboard
Nand-Flash	512MB/1GB/2GB eMMC onboard (Optional)
Network	Integrated 10/100Mbps Ethernet
Audio	HD Audio-Realtek ALC262 CODEC
	Mic-in x 1
	SPK-L , SPK-R (connector) x 1
Serial Interface	RS-232 x 1
	RS-485 x 2
	Can bus x 1
USB	USB ports (Ver2.0) x 2
Digital I/O	8-bit GPIO x 1

## MECHANICAL & ENVIRONMENT

Power Requirement	+5VDC
Power Consumption	+5V@1A
Operating Temperature	0~+50°C (+32~+122°F) / -20~+60°C (-4~+140°F)
Storage Temperature	-30~+70°C (-22~ +158°F)
Operating Humidity	0% ~ 90% Relative Humidity, Non-Condensing
Dimensions	105.5 x 67.2 x 13.6mm (4.15 x 2.65 x 0.54 inches)
Weight	250g

## LCD SPECIFICATIONS

Display Type	4.3" WQVGA TFT LCD
Backlight Unit	LED
Display Resolution	480(W) x 272(H)
Luminance (cd/m <sup>2</sup> )	350 cd/m <sup>2</sup>
Contrast Ratio	450 : 1
Display Color	16.7M
Pixel Configuration	R.G.B Vertical Stripe
Viewing Direction	6 o'clock
Viewing Angle	Vertical 120°, Horizontal 140°

## TOUCHSCREEN

Type	Analog Resistive
Resolution	Continuous
Surface Properties	3H / Anti-Glare
Transmittance	80%
Controller	PS/2 interface
Software Driver	DOS/Linux / WinCE
Durability	1 million

# 1.3 Inspection standard for TFT-LCD Panel

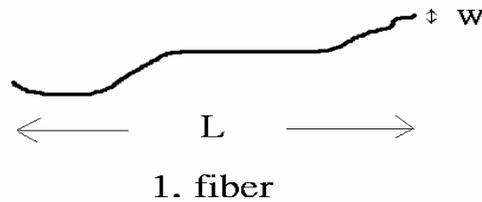
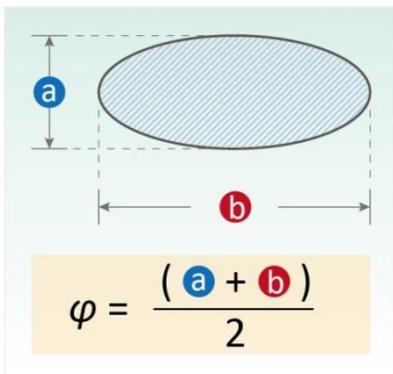
DEFECT TYPE		LIMIT		Note				
VISUAL DEFECT	INTERNAL	SPOT	$\varphi < 0.15\text{mm}$	Ignore				
			$0.15\text{mm} \leq \varphi \leq 0.5\text{mm}$	$N \leq 4$	Note1			
			$0.5\text{mm} < \varphi$	$N = 0$				
		FIBER	$0.03\text{mm} < W \leq 0.1\text{mm}, L \leq 5\text{mm}$	$N \leq 3$	Note1			
			$1.0\text{mm} < W, 1.5\text{mm} < L$	$N = 0$				
		POLARIZER BUBBLE	$\varphi < 0.15\text{mm}$	Ignore	Note1			
			$0.15\text{mm} \leq \varphi \leq 0.5\text{mm}$	$N \leq 2$				
			$0.5\text{mm} < \varphi$	$N = 0$				
		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	
$N \leq 0$	$N \leq 2$			$N \leq 2$	$N \leq 2$	$N \leq 3$	$N \leq 5$	Note2
DARK DOT	$N \leq 2$		$N \leq 3$	$N \leq 3$	$N \leq 3$	$N \leq 5$	$N \leq 8$	Note2
TOTAL DOT	$N \leq 4$			$N \leq 5$	$N \leq 6$	$N \leq 8$		
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.

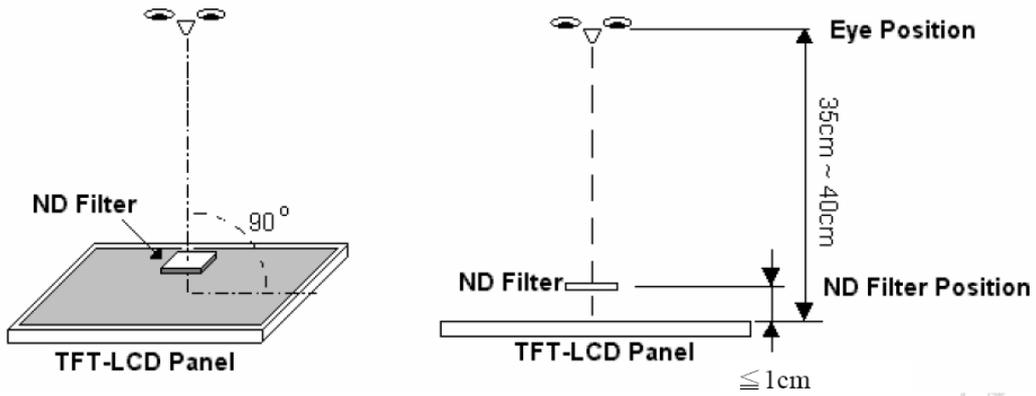
**(3) If require G0 grand (Total dot  $N \leq 0$ ), please contact region sales.**

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

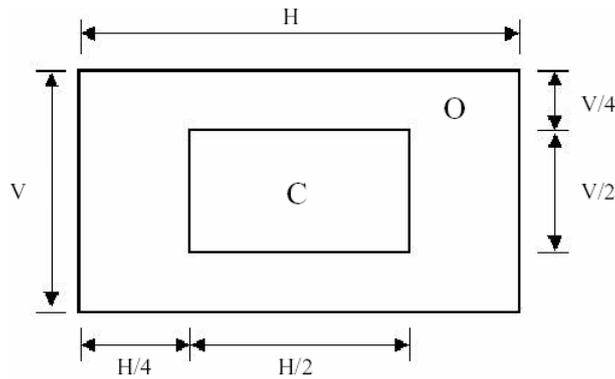


(a) White / Black Spot (b) Polarizer Bubble

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

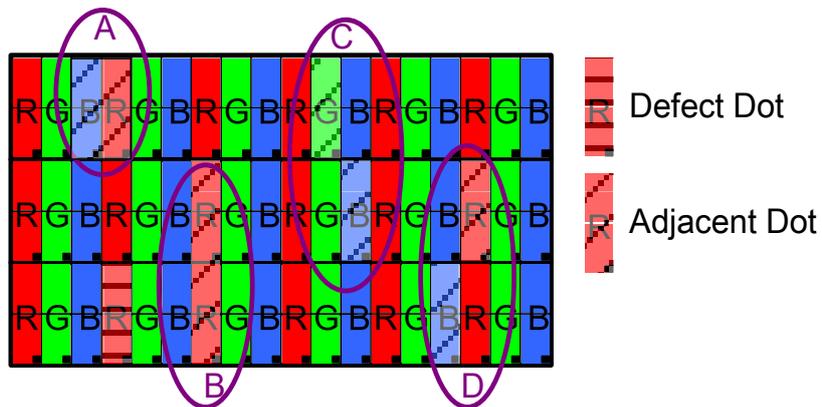


[ Note 3 ] Display area



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

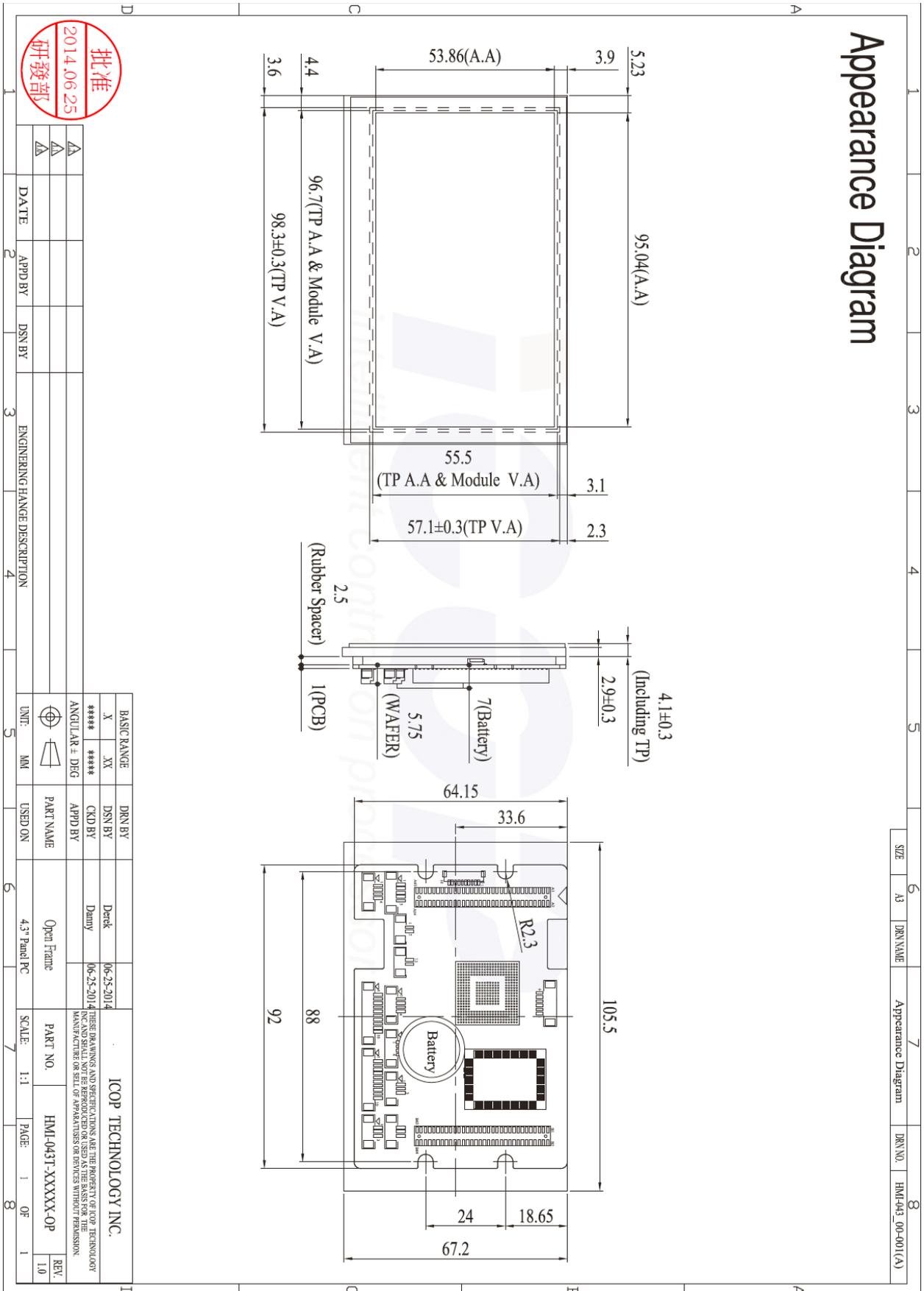
[ Note 4 ] Judge the defect dot and the adjacent dot as following. Allow below (as A, B, C and D status) adjacent defect dots, including bright and dark adjacent dot. And they will be counted 2 defect dots in total quantity.



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



批准  
2014.06.25  
研發部

REV.	DATE	APPD BY	DSN BY	ENGINEERING CHANGE DESCRIPTION	UNIT	USED ON	PART NAME	PART NO.	SCALE	PAGE	OF
△					MM		Open Frame	HMI-043T-XXXXX-OP	1:1	1	1
△					MM						
△					MM						

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06-25-2014

Derek

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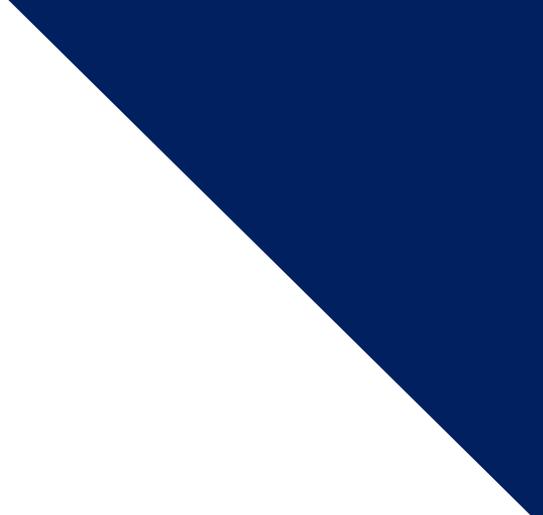
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## 1.5 Ordering Information

PART NUMBER	DESCRIPTION
HMI-043T-EM41N-O	4.3" HMI OP w/128MB/8MBSPI/1U/1S/485/GPIO/SPK/CAN
HMI-043T-EM41B-O	4.3" HMI OP w/128MB/512MBeMMC/8MBSPI/1U/1S/485/GPIO/SPK/CAN
CABLE-265OP-SET	HMI-043T Open Frame cable set

### PACKING LIST

PART NUMBER	PACKAGE
HMI-043T-EM41N-O	HMI-043T-EM41N-O *1
HMI-043T-EM41B-O	HMI-043T-EM41B-O *1
CABLE-265OP-SET	CABLE-265OP-485-15    x 3 . CABLE-265OP-COM-15    x 1 . CABLE-265OP-GPIO-15    x 1 . CABLE-265OP-LAN-15    x 1 . CABLE-265OP-USB-15    x 1 . CABLE-265OP-USB-15-1    x 1 .



# Ch. 2

## System Installation

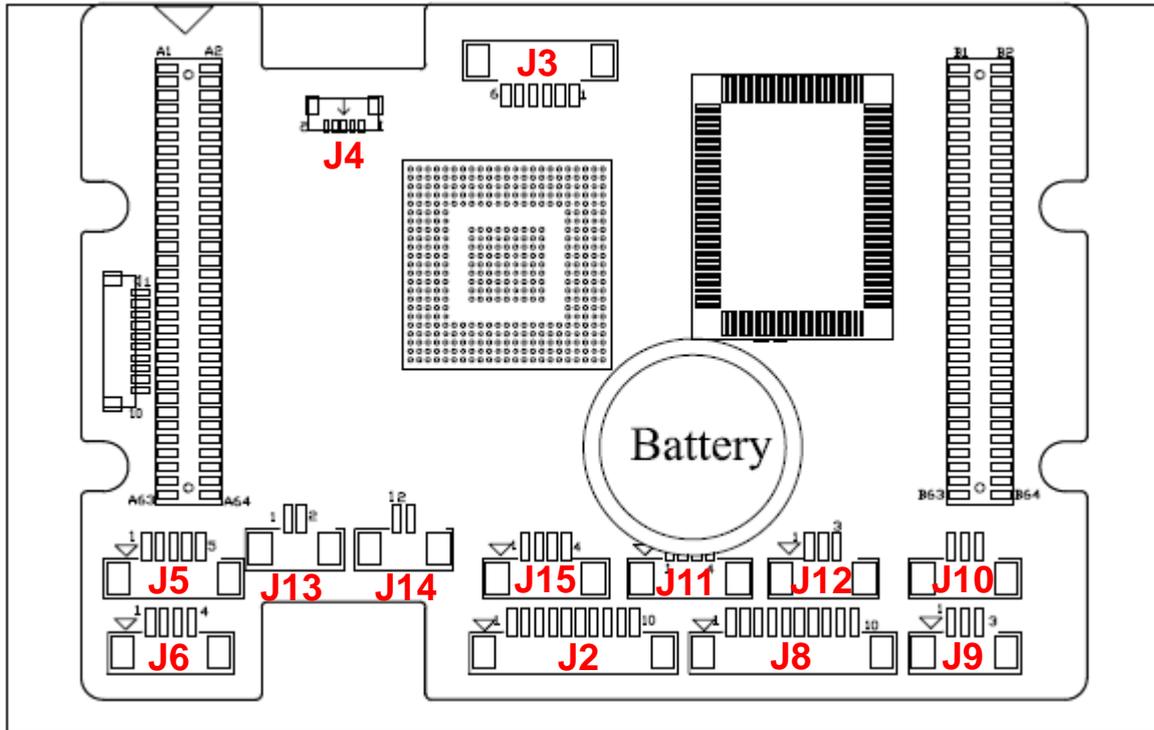
[2.1 CPU Board Outline](#)

[2.2 Connector Summary](#)

[2.3 Connector Pin Assignments](#)

[2.4 Connector I/O Overview](#)

## 2.1 CPU Board Outline



HMI-043T CPU Board

## 2.2 Connector Summary

No.	Description	Type of Connections	Pin #
J1A	Expansion slot	1.27mm 32x2-pin female box header	64-pin
J1B	Expansion slot	1.27mm 32x2-pin female box header	64-pin
J2	GPIO	1.25mm 10-pin wafer	10-pin
J3	JTAG (Debug USE)	1.25mm 6-pin wafer	6-pin
J4	USB	0.8mm 5-pin wafer	5-pin
J5	USB	1.25mm 5-pin wafer	5-pin
J6	LAN	1.25mm 4-pin wafer	4-pin
J8	RS-232	1.25mm 10-pin wafer	10-pin
J9	RS-485	1.25mm 3-pin wafer	3-pin
J10	RS-485	1.25mm 3-pin wafer	3-pin
J11	TOUCH	1.25mm 4-pin wafer	4-pin
J12	CAN	1.25mm 3-pin wafer	3-pin
J13	SPK-L	1.25mm 2-pin wafer	2-pin
J14	SPK-R	1.25mm 2-pin wafer	2-pin
J15	MIC-IN	1.25mm 4-pin wafer	4-pin

## 2.3 Connector Pin Assignments

### J1A/J1B: Expansion Slot

J1A1		J1A2		J1B1		J1B2	
Pin#	Signal Name						
1	RSTDRV	2	GND	1	VCC_IN	2	VCC_IN
3	GP00	4	GP01	3	GP70	4	GP71
5	GP02	6	GP03	5	GP72	6	GP73
7	GP04	8	GP05	7	GP74	8	GP75
9	GP06	10	GP07	9	GP76	10	GP77
11	GP90	12	GP91	11	GP60	12	GP61
13	GP92	14	GP93	13	GP62	14	GP63
15	GP94	16	GP95	15	GP64	16	GP65
17	GP96	18	GP97	17	GP66	18	GP67
19	GND	20	GND	19	GND	20	GND
21	USBD1-	22	USBD2-	21	GP50	22	GP51
23	USBD1+	24	USBD2+	23	GP52	24	GP53
25	AGND	26	AGND	25	GP54	26	GP55
27	ADC_0	28	ADC_1	27	GP56	28	GP57
29	ADC_2	30	ADC_3	29	GP40	30	GP41
31	ADC_4	32	ADC_5	31	GP42	32	GP43
33	ADC_6	34	ADC_7	33	GP44	34	GP45
35	GND	36	GND	35	GP46	36	GP47
37	SATA_TX-	38	SATA_RX-	37	GND	38	GND
39	SATA_TX+	40	SATA_RX+	39	GP30	40	GP31
41	GND	42	HSYNC	41	GP32	42	GP33
43	VGA_R	44	VSYNC	43	GP34	44	GP35
45	VGA_G	46	PCIRST-	45	GP36	46	GP37
47	VGA_B	48	RESET-	47	GP20	48	GP21
49	GND	50	GND	49	GP22	50	GP23
51	LANTX-	52	LANRX-	51	GP24	52	GP25
53	LANTX+	54	LANRX+	53	GP26	54	GP27
55	VBATT	56	VCC1.8_OUT	55	GND	56	GND
57	GP80	58	GP81	57	GP10	58	GP11
59	GP82	60	GP83	59	GP12	60	GP13
61	GP84	62	GP85	61	GP14	62	GP15
63	GP86	64	GP87	63	GP16	64	GP17

### GPIO Function Pin

		GPIO PIN	Function			GPIO PIN	Function
P0/COM1	P0	GP00	COM1_DCD1\	P5		GP50	
		GP01	COM1_TXD1\			GP51	
		GP02	COM1_RTS1\			GP52	
		GP03	COM1_RI1\			GP53	
		GP04	COM1_RXD1\			GP54	
		GP05	COM1_DTR1\			GP55	
		GP06	COM1_DSR1\			GP56	
		GP07	COM1_CTS1\			GP57	
P1/PWM	P1	GP10		P6		GP60	GP60
		GP11				GP61	GP61
		GP12				GP62	GP62
		GP13				GP63	GP63
		GP14				GP64	GP64
		GP15				GP65	GP65
		GP16				GP66	GP66
		GP17				GP67	GP67
P2/Bit-Rich-I/O	P2	GP20	SPI_CS_Touch	P7		GP70	
		GP21	SPI_SCLK_Touch			GP71	
		GP22	SPI_SDI_Touch			GP72	
		GP23	SPI_SDO_Touch			GP73	
		GP24	SPI_INT_Touch			GP74	
		GP25				GP75	
		GP26	En&PWM Dimming Control			GP76	
		GP27				GP77	
P3/COM TXD,RXD	P3	GP30	COM5_TXD5	P8		GP80	HD_BCLK
		GP31	COM5_RXD5			GP81	HD_SYNC
		GP32	COM6_TXD6			GP82	HD_SDO
		GP33	COM6_RXD6			GP83	HD_SDI
		GP34				GP84	HD_RST#
		GP35				GP85	COM5_TXDEN5
		GP36				GP86	COM6_TXDEN6
		GP37				GP87	
P4/Bit-Rich-I/O	P4	GP40	LAN_LINK/ACT	P9		GP90	SDA_D2
		GP41	LAN_DUPLEX			GP91	SDA_D3
		GP42	CAN-TXD			GP92	SDA_CMO
		GP43	CAN-RXD			GP93	SDA_CLK
		GP44				GP94	SDA_D0
		GP45				GP95	SDA_D1
		GP46				GP96	SDA_CD
		GP47				GP97	SDA_WP

**J2: GPIO**

Pin #	Signal Name	Pin #	Signal Name
1	GND	2	GP60
3	GP61	4	GP62
5	GP63	6	GP64
7	GP65	8	GP66
9	GP67	10	VCC

**J4: USB**

Pin #	Signal Name	Pin #	Signal Name
1	VCC	2	LUSB1-
3	LUSB1+	4	GND
5	GGND		

**J5: USB**

Pin #	Signal Name	Pin #	Signal Name
1	VCC	2	LUSB2-
3	LUSB2+	4	GND
5	GGND		

**J6: LAN**

Pin #	Signal Name	Pin #	Signal Name
1	LTX+	2	LTX-
3	LRX+	4	LRX-

**J8: COM**

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

**J9: RS-485**

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

**J10: RS-485**

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

**J11: TOUCH**

Pin #	Signal Name	Pin #	Signal Name
1	Y-	2	X-
3	Y	4	X+

**J12: CAN**

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

**J13: SPK-L**

Pin #	Signal Name	Pin #	Signal Name
1	LOUTP	2	LOUTN

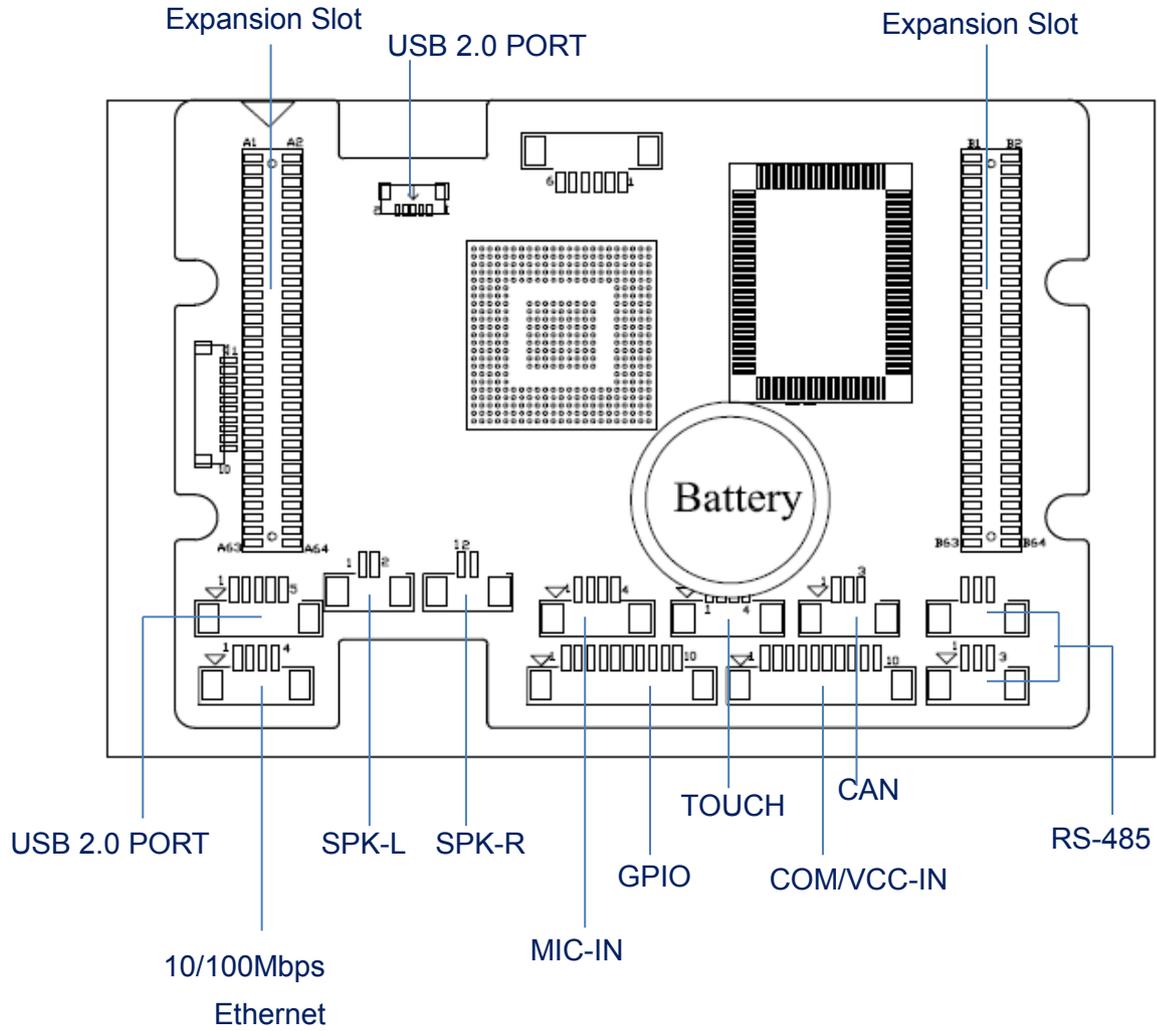
**J14: SPK-R**

Pin #	Signal Name	Pin #	Signal Name
1	ROUTP	2	ROUTN

**J15: MIC-IN**

Pin #	Signal Name	Pin #	Signal Name
1	VREFOUT	2	GND
3	GND	4	MIC1

## 2.4 Connector I/O Overview





# Ch. 3

## Driver Installation

### [3.1 HMI-043T Development Note](#)

## VGA

Vortex86VGA is a programmable VGA controller in 22mm x 16mm LQFP 128 package. It integrates a PCIe bridge controller and a VGA controller with 4M-Byte Pseudo SRAM memory (16-bit data width). It also incorporates 3.3V DVO digital interfaces to support a third party LVDS/TMDS transmitter.

## LAN

The Vortex86DX2 processor is 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.

I/O and IRQ settings can be done by software with the supplied utility software, or it can be set for Plug and Play compatibility. 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 HMI-043T provides the VGA and LAN drivers for DOS, Linux, and Windows CE, Please get the drivers from ICOP technical support URL:

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HMI-043T is an open-source embedded platform based on Vortex86EXm SoC, easy-to-use hardware and software integrated. This platform can support many x86 O/S as well as those running on the original Arduino base system.

## 3.1 HMI-043T Development Note

### < WINDOWS DEVELOPMENT GUIDE >

Windows Embedded CE 6.0 BSP and Windows Embedded Compact 7 BSP with development notes, please visit technical website to get more information at \_\_\_\_\_

### < LINUX INSTALLATION NOTE>

Please visit Linux technical website to get more information at [ftp://ftp.dmp.com.tw/Linux\\_DEMO/Vortex86\\_Linux\\_Support\\_List\\_revised.htm](ftp://ftp.dmp.com.tw/Linux_DEMO/Vortex86_Linux_Support_List_revised.htm).

# 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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