



User's Manual

VOX-084-TS-N8M

NXP i.MX 8M Mini

Open Frame Panel PC with 8.4" TFT LCD and Touch Panels

(Revision V1.0)

REVISION

DATE	VERSION	DESCRIPTION
2024/06/28	Version 1.0	New Release

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Manual # IUMVOX-084-TS-N8M Ver. 1.0 Jun, 2024

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This Manual is for the VOX-084-TS-N8M.

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 0~60°C / -20~+70°C (Option).
- Keep VOX-084-TS-N8M away from humidity.
- 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

Content	iv
Ch. 1 General Information	1
1.1 Product Description	2
1.2 Product Specifications	3
1.3 Inspection standard for TFT-LCD Panel	5
1.4 Product Dimensions.....	8
1.5 Ordering Information.....	9
Ch. 2 System Installation.....	10
2.1 CPU Board Outline	11
2.2 Connector Summary.....	12
2.3 Connector Pin Assignments.....	14
2.4 Boot Mode and Pin Mux Settings.....	18
2.5 External I/O Overview.....	20
Ch. 3 Software Resource	21
3.1 ICOP Wiki	22
Warranty.....	23

Ch. 1

General Information

[1.1 Product Description](#)

[1.2 Product Specifications](#)

[1.3 Inspection standard for TFT-LCD Panel](#)

[1.4 Product Dimensions](#)

[1.5 Ordering Information](#)

1.1 Product Description

ICOP Technology Inc. is proudly going to release a brand new open frame Panel PC, which offers fanless design and low power consumption. The VOX-084-TS-N8M is powered by NXP i.MX 8M Mini, the Quad-Core Cortex-A53 of ARM based processor, and 2GB/4GB LPDDR4 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-084-TS-N8M includes the versatile I/O ports, Gigabit Ethernet x2, 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 slot can be accommodated connectivity requirements to industrial machine platforms and industrial automation equipment's needs.

The VOX-084-TS-N8M supports Yocto Linux and Anroid to meet ready-to-market demand and provide competitive advantages for customer.

1.2 Product Specifications

CPU BOARD SPECIFICATIONS

CPU	NXP i.MX 8M Mini-1.6GHz Cortex-A53 Quad Core
Cache	L2: 512KB Cache
Memory	2GB / 4GB LPDDR4 onboard
Watchdog Timer	Support 3 Watchdog Timer
LAN	Integrated Gigabit Ethernet x2
Audio	High Definition Audio
Internal Drives	16GB / 64GB of eMMC onboard Micro SD slot (Like a card reader only)
Expansion	MiniPCle Slot with Micro SIM Card Holder
I/O	USB2.0 x4 (Include 1 Micro USB for OTG) COM x3 (RS232/RS485 x1, RS232 x1, TX/RX x1; (COM1 reserved for pin mux setting) SPI Bus x1 (Reserved for pin mux setting) RJ-45 Port x2 15-bit GPIO x1 I ² C Interface x1 Audio Line-out x1 Audio Mic-in x1 WLAN & BT x1

MECHANICAL & ENVIRONMENT

Power Requirement	+12 ~ 24VDC Input
Power Consumption	8Watt (Typical)
Operating Temperature	0~60°C / -20~+70°C (Option)

Storage Temperature	-30~+80°C
Operating Humidity	0% ~ 90% Relative Humidity, Non-Condensing
Dimensions	230.4 x 150.0 x 43.1mm
Weight	0.87kg

LCD SPECIFICATIONS

Display Type	8.4" X VGA TFT LCD
Backlight Unit	LED
Display Resolution	800(W) x 600(H)
Brightness (cd/m ²)	350 nits
Contrast Ratio	600 : 1
Display Color	16.7M
Pixel Pitch (mm)	0.213 (H) x 0.213 (V)
Viewing Angle	Vertical 140°, Horizontal 160°
Backlight Lifetime	50,000 hrs

1.3 Inspection standard for TFT-LCD Panel

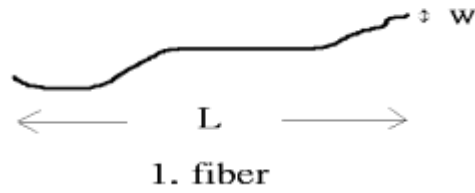
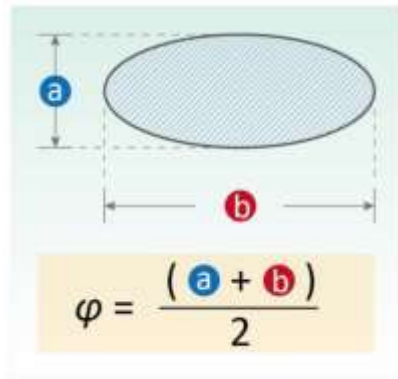
DEFECT TYPE			LIMIT					Note	
VISUAL DEFECT	INTERNAL	SPOT	$\varphi < 0.15\text{mm}$			Ignore		Note1	
			$0.15\text{mm} \leq \varphi \leq 0.5\text{mm}$			$N \leq 4$			
			$0.5\text{mm} < \varphi$			$N=0$			
		FIBER	$0.03\text{mm} < W \leq 0.1\text{mm}, L \leq 5\text{mm}$			$N \leq 3$		Note1	
			$1.0\text{mm} < W, 1.5\text{mm} < L$			$N=0$			
		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	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.

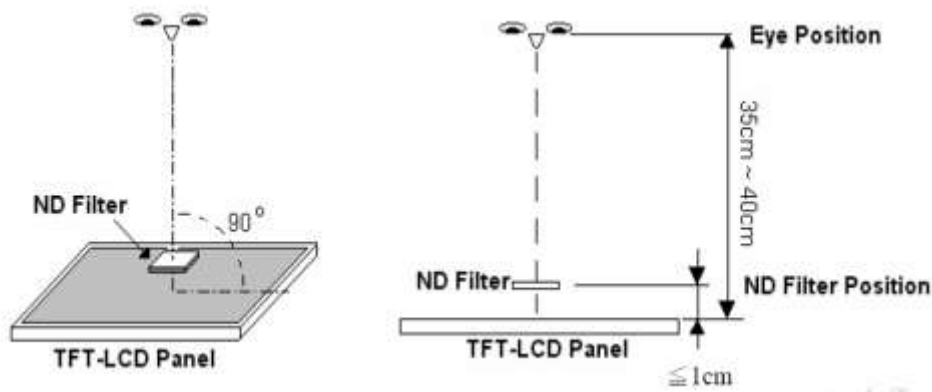
(3) If require G0 grand (Total dot $N \leq 0$), please contact region sales.

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

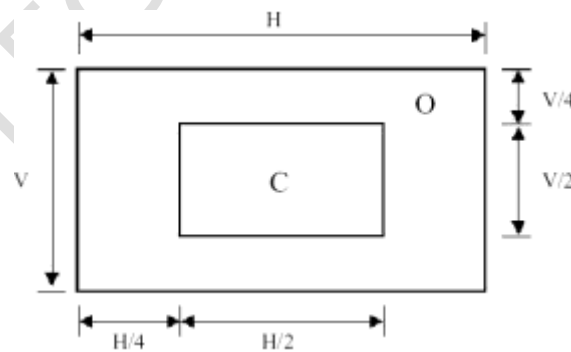


(a) White / Black Spot (b) Polarizer Bubble

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

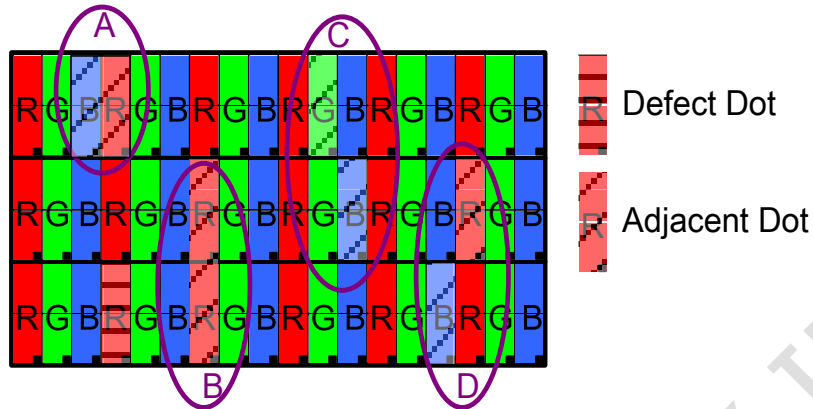


[**Note 3**] Display area



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

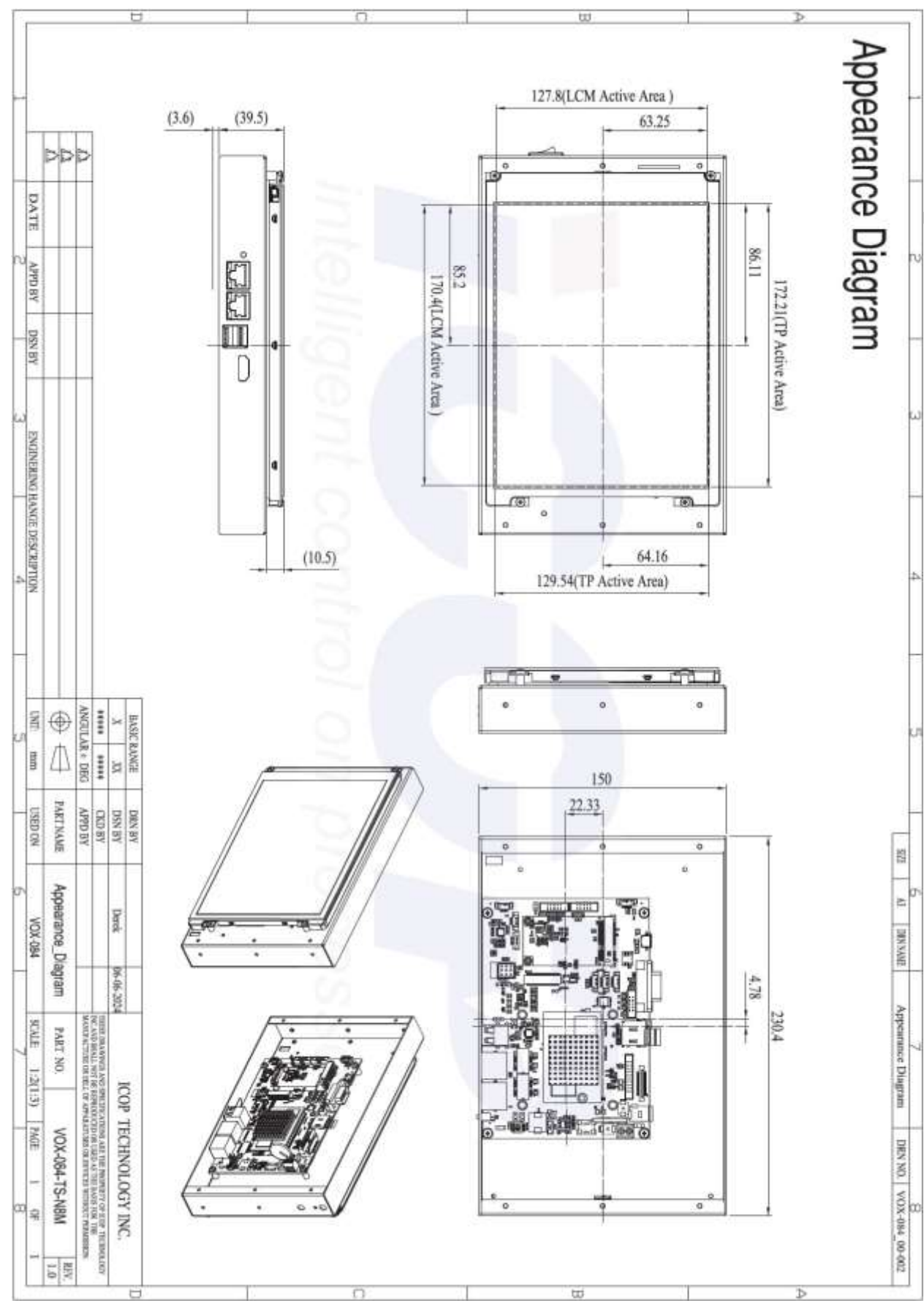
[Note 4] Judge the defect dot and the adjacent dot as following. Allow below (as A, B, C and D status) adjacent defect dots, including bright and dark adjacent dot. And they will be counted 2 defect dots in total quantity.



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.

1.4 Product Dimensions



1.5 Ordering Information

PART NUMBER	DESCRIPTION
VOX-084-TS-N8M-B5GM	8.4" OP w/iMX8M Mini /2GB DRAM /16GB eMMC Onboard /4U /3S /2GLAN /MiniPCle /MicroSD /HD Audio /I ² C /15-bit GPIO / WLAN&BT /+12~24V Input
VOX-084-TS-N8M-B5GMI (Build To Order)	8.4" OP w/iMX8M Mini /2GB DRAM /16GB eMMC Onboard /4U /3S /2GLAN /MiniPCle /MicroSD /HD Audio /I ² C /15-bit GPIO / WLAN&BT /+12~24V Input /-20°C to +70°C
VOX-084-TS-N8M-N5GM (Build To Order)	8.4" OP w/iMX8M Mini /2GB DRAM /16GB eMMC Onboard /4U /3S /2GLAN /MiniPCle /MicroSD /HD Audio /I ² C /15-bit GPIO /+12~24V Input
VOX-084-TS-N8M-N5GMI (Build To Order)	8.4" OP w/iMX8M Mini /2GB DRAM /16GB eMMC Onboard /4U /3S /2GLAN /MiniPCle /MicroSD /HD Audio /I ² C /15-bit GPIO /+12~24V Input /-20°C to +70°C
VOX-084-TS-N8M-B6HM (Build To Order)	8.4" OP w/iMX8M Mini / 4GB DRAM / 64GB eMMC Onboard /4U /3S /2GLAN /MiniPCle /MicroSD /HD Audio /I ² C /15-bit GPIO / WLAN&BT /+12~24V Input
VOX-084-TS-N8M-B6HMI (Build To Order)	8.4" OP w/iMX8M Mini / 4GB DRAM / 64GB eMMC Onboard /4U /3S /2GLAN /MiniPCle /MicroSD /HD Audio /I ² C /15-bit GPIO / WLAN&BT /+12~24V Input /-20°C to +70°C

Ch. 2

System Installation

[2.1 CPU Board Outline](#)

[2.2 Connector Summary](#)

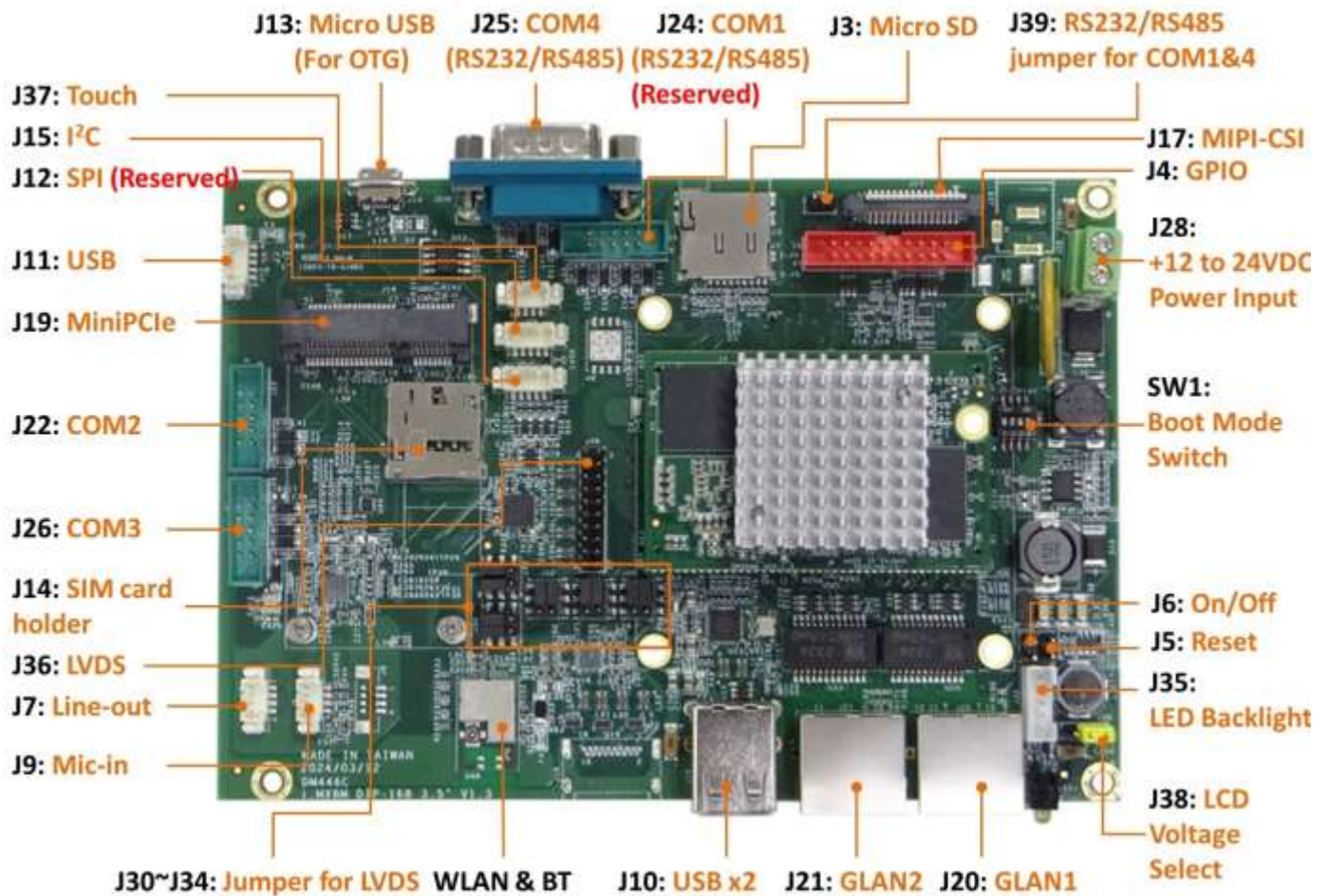
[2.3 Connector Pin Assignments](#)

[2.4 Boot Mode And Pin Mux Settings](#)

[2.5 External I/O Overview](#)

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2.1 CPU Board Outline



CPU Board

2.2 Connector Summary

No.	Description	Type of Connections	Pin #
J3	Micro SD	Micro SD connector	9-pin
J4	GPIO	2.0mm 20-pin box header	20-pin
J5	Reset	2.54mm 2-pin header	2-pin
J6	On/Off	2.54mm 2-pin header	2-pin
J7	Line-out	1.25mm 4-pin wafer	4-pin
J9	Mic-in	1.25mm 4-pin wafer	4-pin
J10	USB x2	Dual USB connector	10-pin
J11	USB	1.25mm 5-pin wafer	5-pin
J12	SPI (Reserved and N/C)	1.25mm 5-pin wafer	5-pin
J13	Micro USB	Micro USB connector	5-pin
J14	SIM card holder	Micro SIM Card Holder for MiniPCle	6-pin
J15	I ² C	1.25mm 5-pin wafer	5-pin
J17	MIPI-CSI	1.0mm 10-pin FPC slot	10-pin
J19	MiniPCle	MiniPCle socket	52-pin
J20	GLAN1	RJ45 connector	8-pin
J21	GLAN2	RJ45 connector	8-pin
J22	COM2	2.0mm 10-pin box header	10-pin
J24	COM1 (Reserved and N/C)	2.0mm 10-pin box header	10-pin
J25	COM4	D-Sub 9-pin connector	9-pin
J26	COM3	2.0mm 10-pin box header	10-pin
J28	+12 to 24VDC power input	2-pin green terminal	2-pin
J30~34	Jumper for LVDS	2.0mm 6-pin header	6-pin

J35	LED Backlight	2.0mm 5-pin wafer	5-pin
J36	LVDS	2.0mm 20-pin header	20-pin
J37	Touch	1.25mm 4-pin wafer	4-pin
J38	LCD voltage select	2.54mm 3-pin header	3-pin
J39	RS232/RS485 jumper for COM1&4	2.54mm 2-pin header	2-pin

2.3 Connector Pin Assignments

J3: Micro SD

Pin #	Signal Name	Pin #	Signal Name
1	DAT2	2	DAT3
3	CMD	4	VDD-
5	CLK	6	VSS
7	DAT0	8	DAT1
9	Card Detect		

J4: GPIO

Pin #	Signal Name	Pin #	Signal Name
1	N/C	2	+3.3V
3	GPIO1_15	4	Original SAI1_RXC
5	Originally SAI3_RXC	6	Originally SAI1_MCLK
7	Originally SAI3_RXD	8	Originally SAI1_RXD0
9	GPIO1_01	10	GPIO4_21
11	GPIO1_07	12	GPIO4_22
13	GPIO5_2 (N/C if enable LCD_BS)	14	GPIO4_31
15	N/C	16	Originally SAI5_MCLK
17	GPIO5_5	18	Originally SAI5_RXFS
19	GND	20	GND

J5: Reset

Pin #	Signal Name	Pin #	Signal Name
1	RST_CORE	2	GND

J6: On/Off

Pin #	Signal Name	Pin #	Signal Name
1	On_Off	2	GND

J7: Line-out

Pin #	Signal Name	Pin #	Signal Name
1	HP_LEFT2_O	2	GND_AUD
3	GND_AUD	4	HP_RIGHT2_O

J9: Mic-in

Pin #	Signal Name	Pin #	Signal Name
1	MICBIAS	2	GND_AUD
3	GND_AUD	4	MIC_IN

J10: USB x2

Pin #	Signal Name	Pin #	Signal Name
1	VCC	6	VCC
2	LUSBD4-	7	LUSBD3-
3	LUSBD4+	8	LUSBD3+
4	GND	9	GND
5	FGND	10	FGND

J11: USB

Pin #	Signal Name	Pin #	Signal Name
1	VCC	2	LUSBD5-
3	LUSBD5+	4	GND
5	FGND		

J12: SPI

(Reserved and N/C because the pin mux is used for COM3 already.)

Pin #	Signal Name	Pin #	Signal Name
1	SPI1_CLK	2	SPI1_MOSI-
3	SPI1_MISO	4	SPI_CS
5	GND		

J13: Micro USB (For OTG)

Pin #	Signal Name	Pin #	Signal Name
1	VCC	2	LUSBD1-
3	LUSBD1+	4	USB1_ID
5	GND		

J14: 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

J15: I²C

Pin #	Signal Name	Pin #	Signal Name
1	I2C3_SCL	2	I2C3_SDA
3	N/C	4	N/C
5	GND		

J17: MIPI-CSI

Pin #	Signal Name	Pin #	Signal Name
1	GND	2	CSI_D0-
3	CSI_D0+	4	GND
5	CSI_D1-	6	CSI_D1+
7	GND	8	CSI_CLK-
9	CSI_CLK+	10	GND
11	CSI_IO_3V3	12	N/C
13	CAMERA_SCL	14	CAMERA_SDA
15	+3.3V		

J19: MiniPCle

Pin #	Signal Name	Pin #	Signal Name
1	PCIE_nWAKE	2	+3.3V
3	N/C	4	GND
5	N/C	6	+1.5V
7	N/C	8	SIM-VCC
9	GND	10	SIM-IO
11	N/C	12	SIM-CLK
13	N/C	14	SIM-RST
15	GND	16	SIM-VPP
Mechanical Key			
17	N/C	18	GND
19	N/C	20	W_DISABLE
21	GND	22	MPCIE_RST-
23	N/C	24	+3.3V
25	N/C	26	GND
27	GND	28	+1.5V
29	GND	30	N/C
31	N/C	32	N/C
33	N/C	34	GND
35	GND	36	GPE1_USB-
37	GND	38	GPE1_USB+
39	+3.3V	40	GND
41	+3.3V	42	N/C
43	GND	44	N/C
45	N/C	46	N/C
47	N/C	48	N/A
49	N/C	50	GND
51	N/C	52	+3.3V

J20: GLAN1

Pin #	Signal Name	Pin #	Signal Name
1	GTX1+	2	GTX1-
3	GRX1+	4	GTXC1+
5	GTXC1-	6	GRX1-
7	GRXD1+	8	GRXD1-

J21: GLAN2

Pin #	Signal Name	Pin #	Signal Name
1	GTX2+	2	GTX2-
3	GRX2+	4	GTXC2+
5	GTXC2-	6	GRX2-
7	GRXD2+	8	GRXD2-

J22: COM2 (RS232)

Pin #	Signal Name	Pin #	Signal Name
1	N/C	2	RXD2
3	TXD2	4	N/C
5	GND	6	N/C
7	N/C	8	N/C
9	N/C	10	N/C

J24: COM1 (RS232 or RS485)

(Reserved and N/C because the pin mux is used for BT already.)

Pin #	Signal Name	Pin #	Signal Name
1	N/C	2	RXD1
3	TXD1	4	RS485+_1
5	GND	6	RS485-_1
7	RTS1	8	CTS1
9	N/C	10	N/C (VCC option)

J25: COM4 (RS232 or RS485)

Pin #	Signal Name	Pin #	Signal Name
1	N/C	2	RXD4
3	TXD4	4	RS485+_4
5	GND	6	RS485-_4
7	N/C	8	N/C
9	N/C		

J26: COM3 (RS232; TTL option)

Pin #	Signal Name	Pin #	Signal Name
1	N/C	2	RXD3
3	TXD3	4	N/C
5	GND	6	N/C
7	RTS3	8	CTS3
9	N/C	10	N/C (VCC option)

J28: +12 to 24VDC power input

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

J30~J34: Jumper for LVDS

Connector	Jumper_1	Jumper_2
J30	3 & 5 closed	4 & 6 closed
J31	3 & 5 closed	4 & 6 closed
J32	3 & 5 closed	4 & 6 closed
J33	3 & 5 closed	4 & 6 closed
J34	3 & 5 closed	4 & 6 closed

J35: LED Backlight

Pin #	Signal Name	Pin #	Signal Name
1	+12V or +5V (Setting on J38)	2	GND
3	Backlight (On/Off)	4	Brightness (PWM)
5	GND		

J36: LVDS

Pin #	Signal Name	Pin #	Signal Name
1	+3.3V	2	+3.3V
3	GND	4	GND
5	LA0P	6	LA0N
7	LA1N	8	GND
9	GND	10	LA1P
11	LA2P	12	LA2N
13	LCKN	14	GND
15	GND	16	LCKP
17	LA3N	18	GND
19	GND	20	LA3P

J37: Touch (For Resistive Touch Panel)

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

J38: LCD Backlight Select

(For J35's Pin1 power voltage supply)

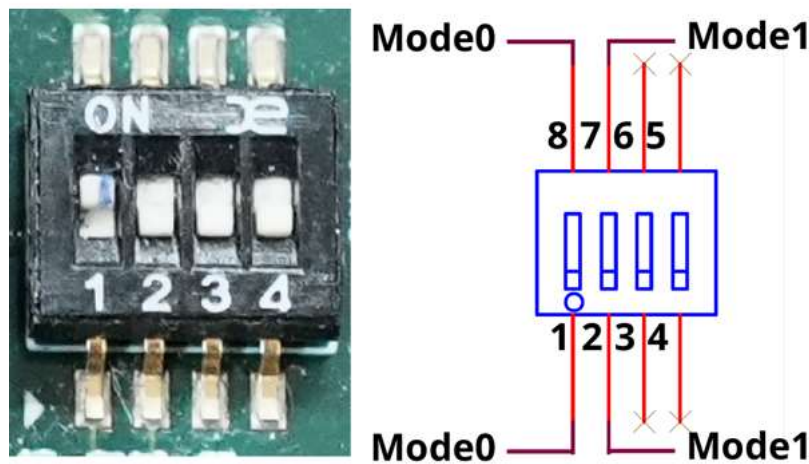
Function	Jumper setting
+12V	Pin1 & 2 closed
+5V	Pin2 & 3 closed

J39: RS232/RS485 jumper for COM1&4

Function	Jumper setting
RS232	Pin1 & 2 opened
RS485	Pin1 & 2 closed

2.4 Boot Mode and Pin Mux Settings

Boot Mode Setting:



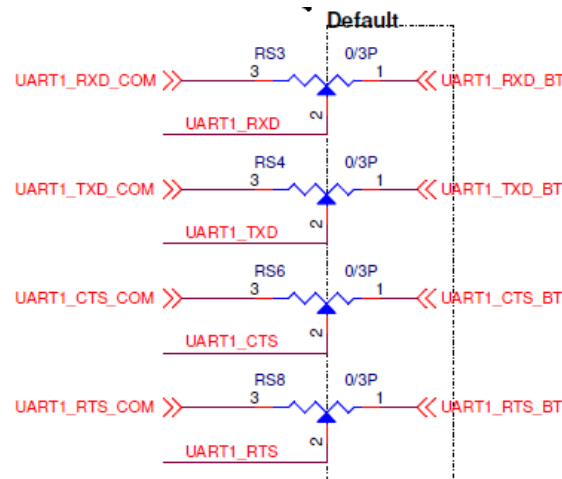
Function	Mode0	Mode1
Internal Boot Mode	Set to “1” position	Set to “7” position
Serial Download Mode (For writing image by Micro USB only)	Set to “8” position	Set to “2” position

Pin Mux Settings:

(1) BT or COM1 function (Choose either one only)

The same pins are used for BT or COM1 function. **(Default is BT.)**
There are 4 resistors, RS3, RS4, RS6 and RS8 that need to be changed for COM1 function, but BT will be no function.

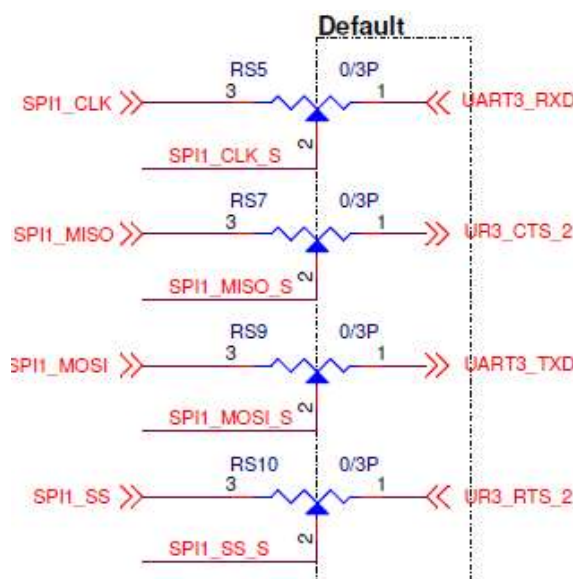
(Please contact ICOP sales representative for detail component positions.)



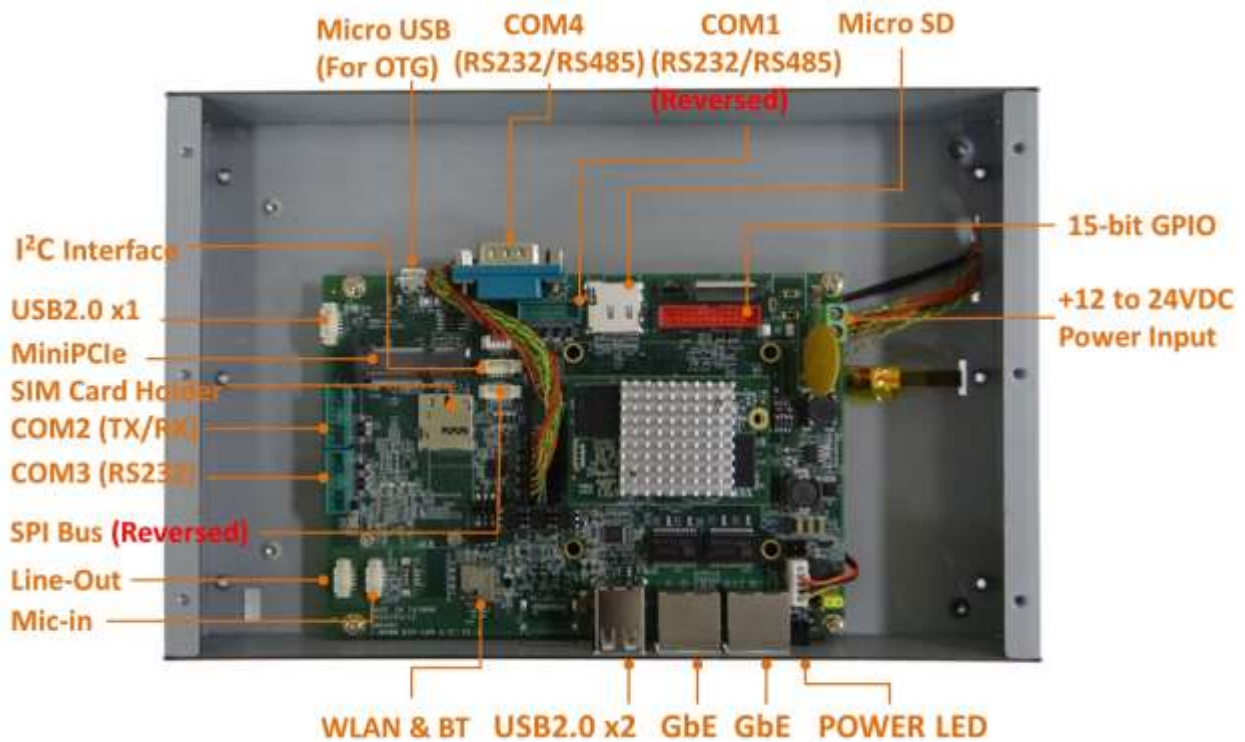
(2) COM3 or SPI function (Choose either one only)

The same pins are used for COM3 or SPI function. **(Default is COM3.)**
There are 4 resistors, RS5, RS7, RS9 and RS10 that need to be changed for SPI function, but COM3 will be no function.

(Please contact ICOP sales representative for detail component positions.)



2.5 External I/O Overview



NOTE

1. MiniPCle Socket supports USB signals only.
2. Micro SIM Card Holder is only for MiniPCI slot.
3. The RS232/485 functions of COM1 and COM4 are selected by J39 headers.
(Please refer the section 2.1 and 2.3.)

Ch. 3

Software Resource

[3.1 ICOP Wiki](#)

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3.1 ICOP Wiki

ICOP Technology has a wiki site which provides all of the software support for VOX-084-TS-N8m's Mainboard, NX8MM-35 such as demo image, recipe, and testing method.

Please check the following link:

<https://wiki.icop.com.tw/product/index.php/NX8MM-35>

If you did not find the resources you need on the wiki site, please contact info@icop.com.tw or your ICOP sales representative.

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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