

**EMB-LN8T**

Intel® Atom™ N455/D525 Processor

Mini-ITX

Realtek 8111E Ethernet

8 USB2.0, 6 COM, 1 Parallel

1 Mini Card

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## Packing List

(Standard, not bulk pack)

Before you begin installing your card, please make sure that the following materials have been shipped:

- 1 9657666600 Jumper Cap
- 1 1709070500 Serial ATA Cable
- 1 1702151200 Onboard Serial ATA Power Cable
- 1 1700060152 Keyboard/Mouse Cable
- 1 Product DVD
- 1 EMB-LN8T

If any of these items should be missing or damaged, please contact your distributor or sales representative immediately.

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Chapter

1

**General  
Information**



## 1.1 Introduction

---

The EMB-LN8T supports Intel® Atom™ N455/ D525 processor which when paired with the Intel® ICH8M chipset offers a high performance computing platform with low power consumption. This new product supports two DDR3 SODIMM at speeds of 800, up to 4GB (D525 only). One CompactFlash™ and three SATA 3.0 Gb/s interfaces provide ample storages. With dual Gigabit Ethernet, six COM ports, eight USB2.0, and one parallel port, the EMB-LN8T meets the requirements of today's demanding applications.

Display requirements are met with an abundance of interfaces such as CRT, 18-bit single channel LVDS or 24-bit single channel LVDS. Simultaneous / Dual View are available in LCD/CRT configurations. Display memory is shared from the system memory up to 324MB/ DVMT4.0.

With all of its integrated features, the EMB-LN8T strikes a balance of performance and price. This versatile product targets Industrial Automation, Entertainment, Networking, KIOSK/POS, Transportation, Banking, Healthcare and Digital Signage applications that require high performance and high reliability.

## 1.2 Features

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- Onboard Intel® Atom™ N455 (Fanless)/ D525 (Heatsink with Fan) Processor
- Intel® Atom™ N455/ D525 + Intel® ICH8M
- 204-pin DDR3 800 SODIMM x 1 (Optional for 2nd SODIMM slot on rear side), Max. 4GB
- Gigabit Ethernet x 2
- CRT, 18-bit/ 24-bit LVDS
- SATA 3.0 Gb/s x 3, CompactFlash™ x 1
- USB2.0 x 8, COM x 6, LPT x 1
- Mini-card x1 (Optional 2nd Mini-card for full size with SIM slot on rear side)
- DC 12V Input with PS-ON Power Type
- Optional TPM1.2

### 1.3 Specifications

---

#### System

- Processor Onboard Intel<sup>®</sup> Atom<sup>™</sup> N455 (Fanless)/ D525 (Heatsink with Fan) Processor, Up to 1.83 GHz
- System Memory 204-pin DDR3 800 SODIMM x 2, Max. 4GB (D525 only)
- Chipset Intel<sup>®</sup> Atom<sup>™</sup> N455/ D525 + Intel<sup>®</sup> ICH8M
- I/O Chipset ITE8712F/KX-L + Fintek81216AD
- Ethernet Realtek 8111E for 10/100/1000Base-TX, RJ-45 x 2
- BIOS AMI Plug & Play SPI BIOS – 8MB ROM
- Wake On LAN Yes
- Watchdog Timer Generates a time-out system reset
- H/W Status Monitoring Supports power supply voltages, cooling fan status, and temperature monitoring
- Expansion Interface Mini-card x1 (Optional 2nd Mini-card for full size with SIM slot on rear side)
- Battery Lithium battery
- Power Requirement DC 12V input with PS-ON Power Type
- Board Size 6.7”(L) x 6.7”(W) (170 mm x 170 mm)
- Gross Weight 1.2 lb (0.5 Kg)
- Operating Temperature 32°F~ 140°F (0°C ~ 60°C)

- Storage Temperature -40°F~ 176°F (-40°C ~ 80°C)
- Operating Humidity 0%~90% relative humidity, non-condensing

### Display: Supports CRT/LCD simultaneous / dual view displays

- Chipset Intel<sup>®</sup> N455/D525 integrated graphics
- Memory Shared system memory up to 324MB w/ DVMT4.0
- Resolution Up to 1366x768, 18bpp for single LVDS channel supporting resolution; Up to 2048x1536@60Hz for Analog RGB display output resolution
- LCD Interface CRT, 18 or 24-bit Single Channel LVDS

### I/O

- Storage SATA 3.0 Gb/s x 3, Type II CompactFlash x 1
- Serial Port RS-232 x 4, RS-232/422/485 x 2
- Parallel Port Supports SPP/ EPP/ ECP mode
- USB USB 2.0 x 8
- PS/2 Port Keyboard x 1, Mouse x 1
- Digital I/O Supports 8-bit (Programmable)

Chapter

2

**Quick  
Installation  
Guide**

## 2.1 Safety Precautions

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**Warning!**

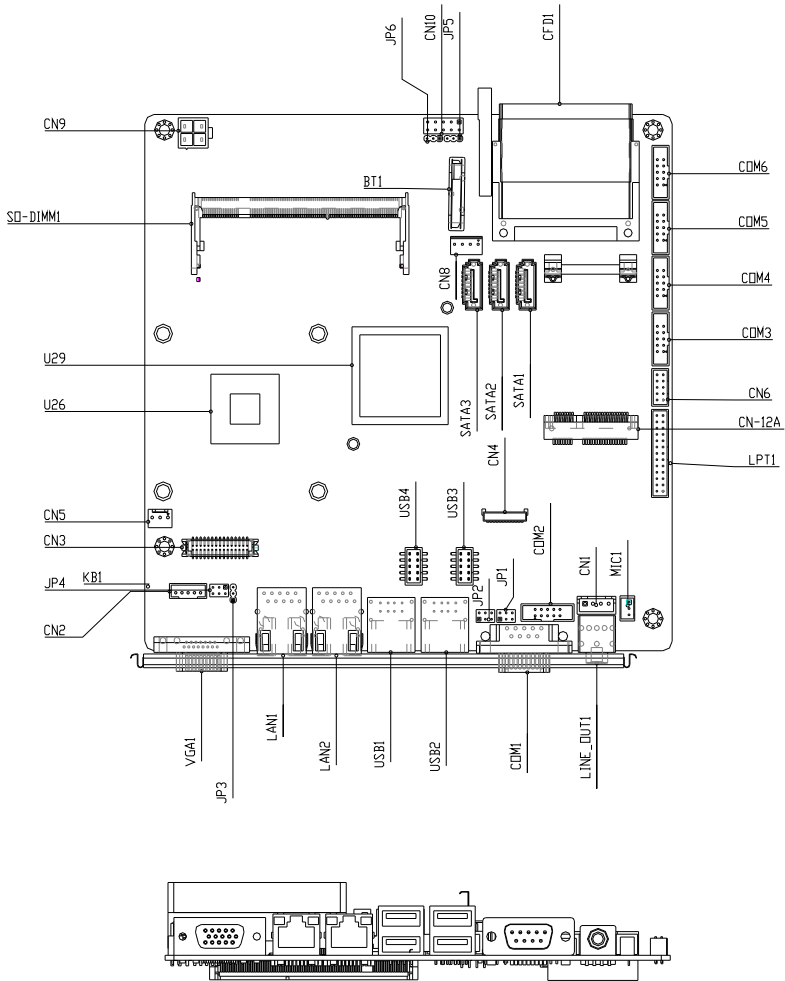
*Always completely disconnect the power cord from your board whenever you are working on it. Do not make connections while the power is on, because a sudden rush of power can damage sensitive electronic components.*

**Caution!**

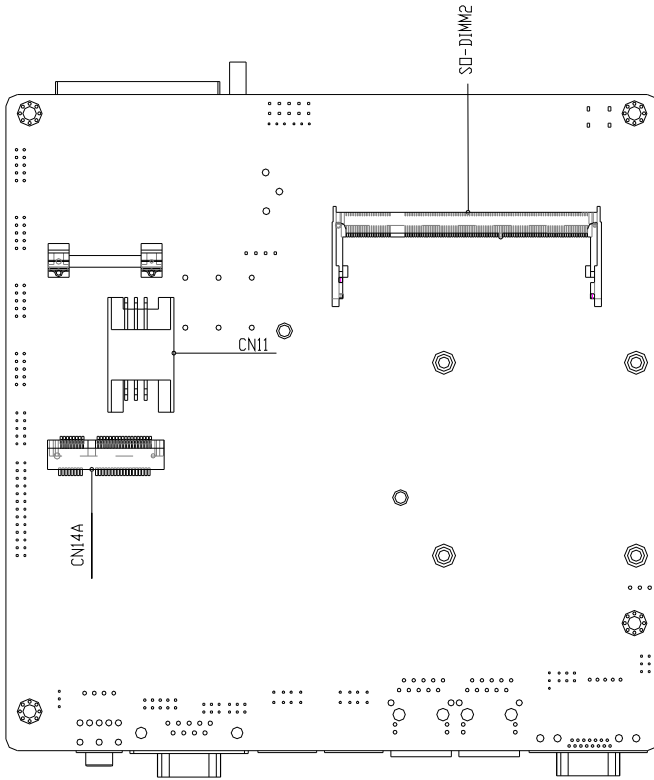
*Always ground yourself to remove any static charge before touching the board. Modern electronic devices are very sensitive to static electric charges. Use a grounding wrist strap at all times. Place all electronic components on a static-dissipative surface or in a static-shielded bag when they are not in the chassis*

## 2.2 Location of Connectors and Jumpers

### Component Side



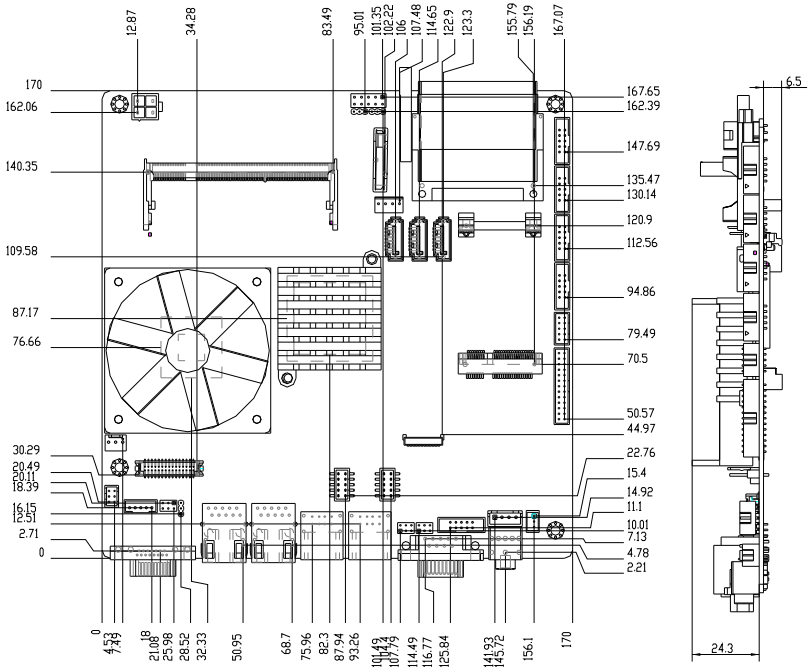
Solder Side



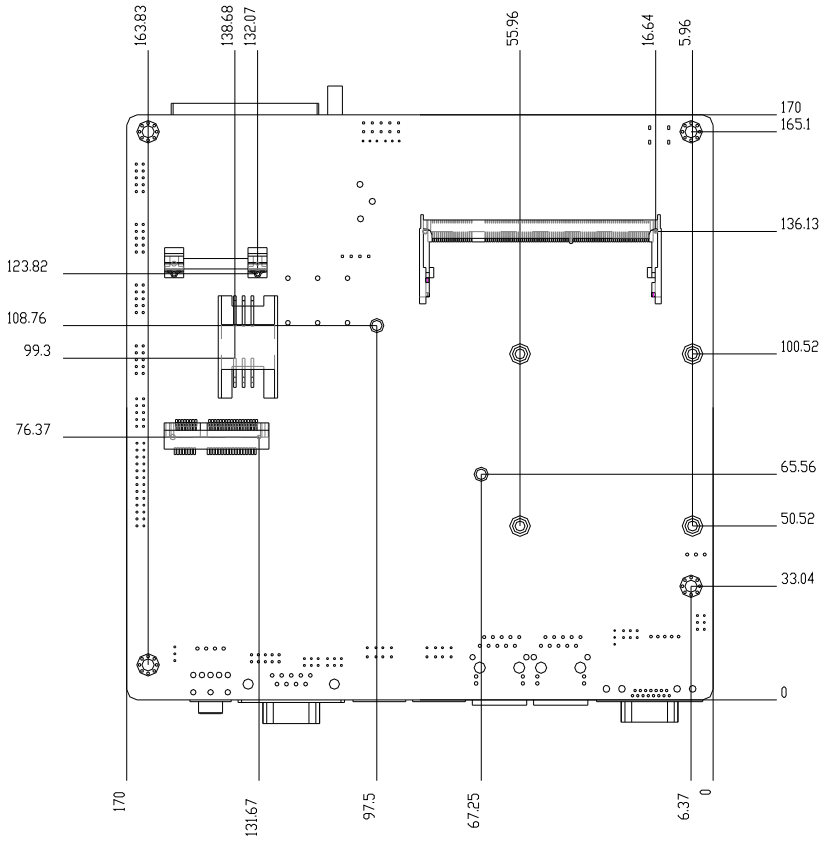


## 2.3 Mechanical Drawing

### Component Side



Solder Side



## 2.4 List of Jumpers

---

The board has a number of jumpers that allow you to configure your system to suit your application.

The table below shows the function of each of the board's jumpers:

<b>Label</b>	<b>Function</b>
JP1	COM2 Ring/+5V/+12V Selection
JP2	COM1 Ring/+5V/+12V Selection
JP3	LCD panel Voltage Selection
JP4	LCD backlight Voltage Selection
JP5	AT/ATX function Selection
JP6	Clear CMOS

## 2.5 List of Connectors

---

The board has a number of connectors that allow you to configure your system to suit your application.

The table below shows the function of each of the board's connectors:

<b>Label</b>	<b>Function</b>
CN1	Internal Audio 2 Channel Connector
CN2	LVDS Backlight Connector
CN3	LVDS Connector
CN4	LPC Connector
CN5	FAN Connector
CN6	Digital I/O Connector
CN7	Mini Card Holder
CN8	SATA POWER Connector
CN9	ATX 4P POWER Connector
CN10	Front Panel Connector
CN11 (Optional)	SIM Card Connector
CN12	Mini Card Connector
CN14 (Optional)	Mini Card Connector
COM1	COM1 RS-232/422/485 Serial Port Connector
COM2	COM2 RS-232/422/485 Serial Port Connector
COM3	COM3 RS-232 Serial Port Connector
COM4	COM4 RS-232 Serial Port Connector
COM5	COM5 RS-232 Serial Port Connector
COM6	COM6 RS-232 Serial Port Connector

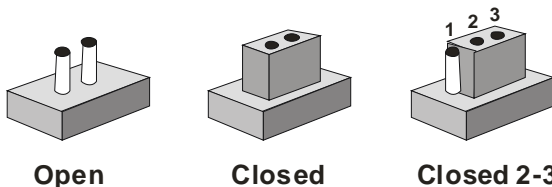
CFD1	CompactFlash Slot
KBMS1	Internal PS2 Keyboard/Mouse Connector
LAN1	1000Base-TX Ethernet Connector
LAN2	1000Base-TX Ethernet Connector
LINE_OUT1	Audio Jack Connector
LPT1	LPT Port Connector
MIC1	Microphone Connector
SODIMM1	SODIMM Slot
SODIMM2 (Optional)	SODIMM Slot
SATA1	SATA Connector
SATA2	SATA Connector
SATA3	SATA Connector
USB1	USB Port Connector
USB2	USB Port Connector
USB3	USB Port Connector
USB4	USB Port Connector
VGA1	CRT Display Connector

## 2.6 Setting Jumpers

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You configure your card to match the needs of your application by setting jumpers. A jumper is the simplest kind of electric switch. It consists of two metal pins and a small metal clip (often protected by a plastic cover) that slides over the pins to connect them. To “close” a jumper you connect the pins with the clip.

To “open” a jumper you remove the clip. Sometimes a jumper will have three pins, labeled 1, 2 and 3. In this case you would connect either pins 1 and 2 or 2 and 3.



A pair of needle-nose pliers may be helpful when working with jumpers.

If you have any doubts about the best hardware configuration for your application, contact your local distributor or sales representative before you make any change.

Generally, you simply need a standard cable to make most connections.

## 2.7 COM2 Ring/+5V/+12V Selection (JP1)

---

JP1	Function
1-2	+12V
3-4	Ring (Default)
5-6	+5V

## 2.8 COM1 Ring/+5V/+12V Selection (JP2)

---

JP2	Function
1-2	+12V
3-4	Ring (Default)
5-6	+5V

## 2.9 LCD Voltage Selection (JP3)

---

JP3	Function
1-2	+5V
2-3	+3.3V (Default)

## 2.10 LCD Backlight Control Selection (JP4)

---

### Backlight Control

JP4	Function
1-3	Chips control
3-5	I2C control (Default)

### Backlight Voltage

JP4	Function
2-4	+5V
4-6	+12V (Default)

### 2.11 AT/ATX Selection (JP5)

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JP5	Function
1-2	ATX (Default)
2-3	AT

### 2.12 Clear CMOS Selection (JP6)

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JP6	Function
1-2	Protected (Default)
2-3	Clear

### 2.13 Internal Audio 2 Channel Connector (CN1)

---

Pin	Signal
1	SPEAK-OUT R+
2	SPEAK-OUT R-
3	SPEAK-OUT L+
4	SPEAK-OUT L-

### 2.14 LVDS Backlight Connector (CN2)

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Pin	Signal
1	LVDS Voltage select
2	LVDS Backlight control
3	GND
4	GND
5	LVDS Backlight Enable

### 2.15 LVDS Connector (CN3)

---

Pin	Signal	Pin	Signal
1	LVDS_BKLEN	2	LVDS_BKLCTL
3	PPVCC	4	GND
5	LVDS_TXLCLK#	6	LVDS_TXLCLK



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7	PPVCC	8	GND
9	LVDS_TXL0#	10	LVDS_TXL0
11	LVDS_TXL1#	12	LVDS_TXL1
13	LVDS_TXL2#	14	LVDS_TXL2
15	LVDS_TXL3#	16	LVDS_TXL3
17	LVDS_DDCPDATA	18	LVDS_DDCPCLK
19	N.C	20	N.C
21	N.C	22	N.C
23	N.C	24	N.C
25	N.C	26	N.C
27	PPVCC	28	GND
29	N.C	30	N.C

**2.16 LPC Connector (CN4)**

<b>Pin</b>	<b>Signal</b>
1	LAD0
2	LAD1
3	LAD2
4	LAD3
5	+3.3V
6	LFRAME#
7	RESET#
8	GND
9	LPC_CLK(33MHz)
10	LDRQ#0
11	LDRQ#1
12	SERIRQ

## 2.17 Fan Connector (CN5)

Pin	Signal
1	GND
2	Power control
3	Speed detection

## 2.18 Digital I/O Connector (CN6)

This connector offers 4-pair of digital I/O functions and address is 600H.

Pin	Signal	Pin	Signal
1	DIO1-1	2	DIO1-2
3	DIO1-3	4	DIO1-4
5	DIO1-5	6	DIO1-6
7	DIO1-7	8	DIO1-8
9	+5V	10	GND

**Note:** The max. rating of Pin 1~ Pin 8 is 5V @ 8mA  
The max. rating of Pin 9 is 5V @0.5A

BIOS Setting	Connector Definition	Address	IT8712 GPIO Setting
Port 1	CN6 Pin 1	Bit 0	U20 Pin 27 (GPIO 20)
Port 2	CN6 Pin 2	Bit 1	U20 Pin 26 (GPIO 21)
Port 3	CN6 Pin 3	Bit 2	U20 Pin 25 (GPIO 22)
Port 4	CN6 Pin 4	Bit 3	U20 Pin 24 (GPIO 23)
Port 5	CN6 Pin 5	Bit 4	U20 Pin 23 (GPIO 24)
Port 6	CN6 Pin 6	Bit 5	U20 Pin 22 (GPIO 25)
Port 7	CN6 Pin 7	Bit 6	U20 Pin 21 (GPIO 26)
Port 8	CN6 Pin 8	Bit 7	U20 Pin 20 (GPIO 27)

### 2.19 SATA Power Connector (CN8)

---

Pin	Signal
1	+12V
2	GND
3	GND
4	+5V

### 2.20 ATX Power\_12V Connector (CN9)

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Pin	Signal	Pin	Signal
1	GND	2	GND
3	+12V	4	+12V

### 2.21 Front Panel Connector (CN10)

---

Pin	Signal	Pin	Signal
1	Power On Button(-)	2	Power On Button(+)
3	IDE LED(-)	4	IDE LED(+)
5	External Buzzer(-)	6	External Buzzer(+)
7	Power LED(-)	8	Power LED(+)
9	Reset Switch(-)	10	Reset Switch(+)

### 2.22 RS-232 Serial Port Connector (COM1)

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Pin	Signal	Pin	Signal
1	DCD#1(485D-/422TXD-)	2	RXD1(422RXD+)
3	TXD1(485D+/422TXD+)	4	DTR#1(422RXD-)
5	GND	6	DSR#1
7	RTS#1	8	CTS#1
9	RI#1		

**2.23 RS-232 Serial Port Connector (COM2)**

Pin	Signal	Pin	Signal
1	DCD#2(485D-/422TXD-)	2	RXD2(422RXD+)
3	TXD2(485D+/422TXD+)	4	DTR#2(422RXD-)
5	GND	6	DSR#2
7	RTS#2	8	CTS#2
9	RI#2		

**2.24 RS-232 Serial Port Connector (COM3)**

Pin	Signal	Pin	Signal
1	DCD#3	2	RXD3
3	TXD3	4	DTR#3
5	GND	6	DSR#3
7	RTS#3	8	CTS#3
9	RI#3		

**2.25 RS-232 Serial Port Connector (COM4)**

Pin	Signal	Pin	Signal
1	DCD#4	2	RXD4
3	TXD4	4	DTR#4
5	GND	6	DSR#4
7	RTS#4	8	CTS#4
9	RI#4		

**2.26 RS-232 Serial Port Connector (COM5)**

Pin	Signal	Pin	Signal
1	DCD#5	2	RXD5
3	TXD5	4	DTR#5
5	GND	6	DSR#5

7	RTS#5	8	CTS#5
9	RI#5		

### 2.27 RS-232 Serial Port Connector (COM6)

Pin	Signal	Pin	Signal
1	DCD#6	2	RXD6
3	TXD6	4	DTR#6
5	GND	6	DSR#6
7	RTS#6	8	CTS#6
9	RI#6		

### 2.28 Internal PS2 Keyboard and Mouse Connector (KBMS1)

Pin	Signal	Pin	Signal
1	KBDATA	2	KBCLK
3	GND	4	+5V
5	MSDATA	6	MSCLK

### 2.29 LPT Port Connector (LPT1)

Pin	Signal	Pin	Signal
1	#STROBE	2	#AFD
3	DATA0	4	#ERROR
5	DATA1	6	#INIT
7	DATA2	8	#SLIN
9	DATA3	10	GND
11	DATA4	12	GND
13	DATA5	14	GND
15	DATA6	16	GND
17	DATA7	18	GND
19	#ACK	20	GND

21	BUSY	22	GND
23	PE	24	GND
25	SELECT	26	N.C

### 2.30 Microphone Connector (MIC1)

Pin	Signal
1	MIC-L
2	MIC-R

### 2.31 USB Port Connector (USB3)

Pin	Signal	Pin	Signal
1	+5V	2	GND
3	USBD4-	4	GND
5	USBD4+	6	USBD5+
7	GND	8	USBD5-
9	GND	10	+5V

### 2.32 USB Port Connector (USB4)

Pin	Signal	Pin	Signal
1	+5V	2	GND
3	USBD6-	4	GND
5	USBD6+	6	USBD6+
7	GND	8	USBD6-
9	GND	10	+5V

## Below Table for China RoHS Requirements

产品中有毒有害物质或元素名称及含量

## AAEON Main Board/ Daughter Board/ Backplane

部件名称	有毒有害物质或元素					
	铅 (Pb)	汞 (Hg)	镉 (Cd)	六价铬 (Cr(VI))	多溴联苯 (PBB)	多溴二苯醚 (PBDE)
印刷电路板 及其电子组件	×	○	○	○	○	○
外部信号 连接器及线材	×	○	○	○	○	○
<p><b>O:</b> 表示该有毒有害物质在该部件所有均质材料中的含量均在 SJ/T 11363-2006 标准规定的限量要求以下。</p> <p><b>X:</b> 表示该有毒有害物质至少在该部件的某一均质材料中的含量超出 SJ/T 11363-2006 标准规定的限量要求。</p> <p>备注: 此产品所标示之环保使用期限, 系指在一般正常使用状况下。</p>						

Chapter

3

**AMI  
BIOS Setup**



### 3.1 System Test and Initialization

---

These routines test and initialize board hardware. If the routines encounter an error during the tests, you will either hear a few short beeps or see an error message on the screen. There are two kinds of errors: fatal and non-fatal. The system can usually continue the boot up sequence with non-fatal errors.

#### **System configuration verification**

These routines check the current system configuration against the values stored in the CMOS memory. If they do not match, the program outputs an error message. You will then need to run the BIOS setup program to set the configuration information in memory.

There are three situations in which you will need to change the CMOS settings:

1. You are starting your system for the first time
2. You have changed the hardware attached to your system
3. The CMOS memory has lost power and the configuration information has been erased.

The EMB-LN8T CMOS memory has an integral lithium battery backup for data retention. However, you will need to replace the complete unit when it finally runs down.

## 3.2 AMI BIOS Setup

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AMI BIOS ROM has a built-in Setup program that allows users to modify the basic system configuration. This type of information is stored in battery-backed CMOS RAM so that it retains the Setup information when the power is turned off.

### Entering Setup

Power on the computer and press <Del> or <F2> immediately. This will allow you to enter Setup.

### Main

Set the date, use tab to switch between date elements.

### Advanced

Enable/disable boot option for legacy network devices.

### Chipset

host bridge parameters.

### Boot

Enables/disables quiet boot option.

### Security

Set setup administrator password.

### Save&Exit

Exit system setup after saving the changes.

Chapter

4

**Driver  
Installation**

The EMB-LN8T comes with an AutoRun CD-ROM that contains all drivers and utilities that can help you to install the driver automatically.

Insert the driver CD, the driver CD-title will auto start and show the installation guide. If not, please follow the sequence below to install the drivers.

***Follow the sequence below to install the drivers:***

- Step 1 – Install Chipset Driver
- Step 2 – Install VGA Driver
- Step 3 – Install Audio Device
- Step 4 – Install LAN Driver
- Step 5 – Install TPM Driver
- Step 6 – Install Serial Port Driver (Optional)

**Note:** If you got compatible issue for COM port, please find its driver under STEP 6 folder and then install it by administrative login permission.

Please read instructions below for further detailed installations.

## 4.1 Installation:

---

Insert the EMB-LN8T CD-ROM into the CD-ROM drive. And install the drivers from Step 1 to Step 6 in order.

### Step 1 – Install Chipset Driver

1. Click on the **STEP 1 - CHIPSET** folder and select the OS folder your system is
2. Double click on the **.exe** file located in each OS folder
3. Follow the instructions that the window shows
4. The system will help you install the driver automatically

### Step 2 – Install VGA Driver

1. Click on the **STEP 2 - VGA** folder and select the OS folder your system is
2. Double click on the **Setup.exe** file located in each OS folder
3. Follow the instructions that the window shows
4. The system will help you install the driver automatically

### Step 3 –Install Audio Device

1. Click on the **STEP 3 - AUDIO** folder and select the OS folder your system is
2. Double click on the **SETUP.exe** file located in each OS folder

3. Follow the instructions that the window shows
4. The system will help you install the driver automatically

#### Step 4 –Install LAN Driver

1. Click on the **STEP 4 - LAN** folder and select the OS folder your system is
2. Double click on the **setup.exe** located in each OS folder
3. Follow the instructions that the window shows
4. The system will help you install the driver automatically

#### Step 5 – Install TPM Driver

1. Click on the **STEP 5 - TPM** folder and select the folder of **DRIVER**, and double click on the **setup.exe** file
2. After done installing the driver above, click on the folder **TPM\_HostSW\_3.0\_SP2\_IFX** that is in **AP folder**, and then double click on the **setup.exe** file
3. Follow the instructions that the window shows
4. The system will help you install the driver automatically

#### Step 6 –Install Serial Port Driver (Optional)

1. Click on the **STEP 6 – Serial Port (Option)** folder and double click on the **patch.bat**
2. Follow the instructions that the window shows
3. The system will help you install the driver automatically

Appendix

**A**

# Programming the Watchdog Timer

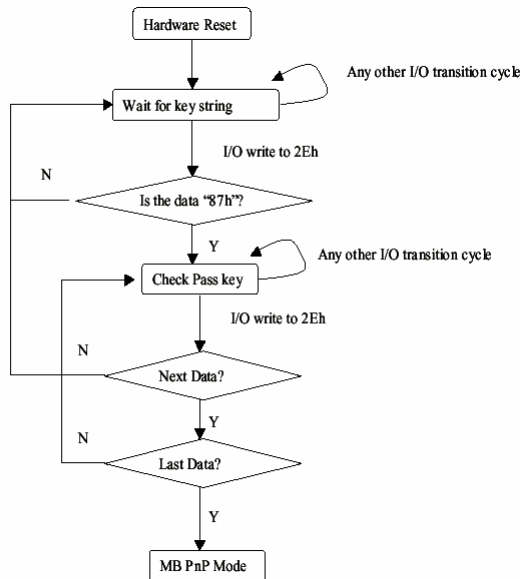
## A.1 Programming

EMB-LN8T utilizes ITE 8712 chipset as its watchdog timer controller.

Below are the procedures to complete its configuration and the AAeon initial watchdog timer program is also attached based on which you can develop customized program to fit your application.

### Configuring Sequence Description

After the hardware reset or power-on reset, the ITE 8712 enters the normal mode with all logical devices disabled except KBC. The initial state (enable bit) of this logical device (KBC) is determined by the state of pin 121 (DTR1#) at the falling edge of the system reset during power-on reset.





There are three steps to complete the configuration setup: (1) Enter the MB PnP Mode; (2) Modify the data of configuration registers; (3) Exit the MB PnP Mode. Undesired result may occur if the MB PnP Mode is not exited normally.

### (1) Enter the MB PnP Mode

To enter the MB PnP Mode, four special I/O write operations are to be performed during Wait for Key state. To ensure the initial state of the key-check logic, it is necessary to perform four write operations to the Special Address port (2EH). Two different enter keys are provided to select configuration ports (2Eh/2Fh) of the next step.

	Address Port	Data Port
87h, 01h, 55h, 55h:	2Eh	2Fh

### (2) Modify the Data of the Registers

All configuration registers can be accessed after entering the MB PnP Mode. Before accessing a selected register, the content of Index 07h must be changed to the LDN to which the register belongs, except some Global registers.

### (3) Exit the MB PnP Mode

Set bit 1 of the configure control register (Index=02h) to 1 to exit the MB PnP Mode.

**WatchDog Timer Configuration Registers**

LDN	Index	R/W	Reset	Configuration Register or Action
All	02H	W	N/A	Configure Control
07H	71H	R/W	00H	WatchDog Timer Control Register
07H	72H	R/W	00H	WatchDog Timer Configuration Register
07H	73H	R/W	00H	WatchDog Timer Time-out Value Register

**Configure Control (Index=02h)**

This register is write only. Its values are not sticky; that is to say, a hardware reset will automatically clear the bits, and does not require the software to clear them.

Bit	Description
7-2	Reserved
1	Returns to the Wait for Key state. This bit is used when the configuration sequence is completed
0	Resets all logical devices and restores configuration registers to their power-on states.

**WatchDog Timer Control Register (Index=71h, Default=00h)**

Bit	Description
7	WDT is reset upon a CIR interrupt
6	WDT is reset upon a KBC (mouse) interrupt
5	WDT is reset upon a KBC (keyboard) interrupt
4	WDT is reset upon a read or a write to the Game Port base address
3-2	Reserved
1	Force Time-out. This bit is self-clearing
0	WDT Status
	1: WDT value reaches 0.
	0: WDT value is not 0

**WatchDog Timer Configuration Register (Index=72h, Default=00h)**

Bit	Description
7	WDT Time-out value select
	1: Second
	0: Minute
6	WDT output through KRST (pulse) enable
5-4	Reserved
3-0	Select the interrupt level <sup>Note</sup> for WDT

**WatchDog Timer Time-out Value Register (Index=73h, Default=00h)**

Bit	Description
7-0	WDT Time-out value 7-0

## A.2 IT8712 Watchdog Timer Initial Program

---

```
.MODEL SMALL
```

```
.CODE
```

Main:

```
CALL Enter_Configuration_mode
```

```
CALL Check_Chip
```

```
mov cl, 7
```

```
call Set_Logic_Device
```

```
;time setting
```

```
mov cl, 10 ; 10 Sec
```

```
dec al
```

Watch\_Dog\_Setting:

```
;Timer setting
```

```
mov al, cl
```

```
mov cl, 73h
```

```
call Superio_Set_Reg
```

```
;Clear by keyboard or mouse interrupt
```

```
mov al, 0f0h
```

```
mov cl, 71h
```

```
call Superio_Set_Reg
```

```
;unit is second.
```

```
mov al, 0C0H
```

```
mov cl, 72h
```

```
call Superio_Set_Reg
```

```
; game port enable  
mov cl, 9  
call Set_Logic_Device
```

```
Initial_OK:  
CALL Exit_Configuration_mode  
MOV AH,4Ch  
INT 21h
```

```
Enter_Configuration_Mode PROC NEAR  
MOV SI,WORD PTR CS:[Offset Cfg_Port]
```

```
MOV DX,02Eh  
MOV CX,04h  
Init_1:  
MOV AL,BYTE PTR CS:[SI]  
OUT DX,AL  
INC SI  
LOOP Init_1  
RET  
Enter_Configuration_Mode ENDP
```

```
Exit_Configuration_Mode PROC NEAR  
MOV AX,0202h  
CALL Write_Configuration_Data
```

RET

Exit\_Configuration\_Mode ENDP

Check\_Chip PROC NEAR

MOV AL,20h

CALL Read\_Configuration\_Data

CMP AL,87h

JNE Not\_Initial

MOV AL,21h

CALL Read\_Configuration\_Data

CMP AL,12h

JNE Not\_Initial

Need\_Initial:

STC

RET

Not\_Initial:

CLC

RET

Check\_Chip ENDP

Read\_Configuration\_Data PROC NEAR

MOV DX,WORD PTR CS:[Cfg\_Port+04h]

OUT DX,AL

```
MOV DX,WORD PTR CS:[Cfg_Port+06h]
IN AL,DX
RET
Read_Configuration_Data ENDP
```

```
Write_Configuration_Data PROC NEAR
MOV DX,WORD PTR CS:[Cfg_Port+04h]
OUT DX,AL
XCHG AL,AH
MOV DX,WORD PTR CS:[Cfg_Port+06h]
OUT DX,AL
RET
Write_Configuration_Data ENDP
```

```
Superio_Set_Reg proc near
push ax
MOV DX,WORD PTR CS:[Cfg_Port+04h]
mov al,cl
out dx,al
pop ax
inc dx
out dx,al
ret
Superio_Set_Reg endp.Set_Logic_Device proc near
Set_Logic_Device proc near
```

```
push ax
push cx
xchg al,cl
mov cl,07h
call Superio_Set_Reg
pop cx
pop ax
ret
Set_Logic_Device endp

;Select 02Eh->Index Port, 02Fh->Data Port
Cfg_Port DB 087h,001h,055h,055h

DW 02Eh,02Fh
```

## END Main

*Note: Interrupt level mapping*

0Fh-Dh: not valid

0Ch: IRQ12

.

.

03h: IRQ3

02h: not valid

01h: IRQ1

00h: no interrupt selected
























































Appendix

**B**

**I/O Information**

## B.1 I/O Address Map

Address Range	Device Name
[00000000 - 0000000F]	Direct memory access controller
[00000000 - 000000CF7]	PCI bus
[00000010 - 0000001F]	Motherboard resources
[00000020 - 00000021]	Programmable interrupt controller
[00000022 - 0000003F]	Motherboard resources
[00000040 - 00000043]	System timer
[00000044 - 0000005F]	Motherboard resources
[00000060 - 00000060]	Standard 101/102-Key or Microsoft Natural PS/2 Keyboard
[00000061 - 00000061]	System speaker
[00000062 - 00000063]	Motherboard resources
[00000064 - 00000064]	Standard 101/102-Key or Microsoft Natural PS/2 Keyboard
[00000065 - 0000006F]	Motherboard resources
[00000070 - 00000071]	System CMOS/real time clock
[00000072 - 0000007F]	Motherboard resources
[00000080 - 00000080]	Motherboard resources
[00000081 - 00000083]	Direct memory access controller
[00000084 - 00000086]	Motherboard resources
[00000087 - 00000087]	Direct memory access controller
[00000088 - 00000088]	Motherboard resources
[00000089 - 0000008B]	Direct memory access controller
[0000008C - 0000008E]	Motherboard resources
[0000008F - 0000008F]	Direct memory access controller
[00000090 - 0000009F]	Motherboard resources
[000000A0 - 000000A1]	Programmable interrupt controller
[000000A2 - 000000BF]	Motherboard resources
[000000C0 - 000000DF]	Direct memory access controller
[000000E0 - 000000EF]	Motherboard resources
[000000F0 - 000000FF]	Numeric data processor
[00000170 - 00000177]	Secondary IDE Channel
[000001F0 - 000001F7]	Primary IDE Channel
[00000274 - 00000277]	ISAPNP Read Data Port
[00000279 - 00000279]	ISAPNP Read Data Port
[000002D0 - 000002D7]	Communications Port (COM5)
[000002D8 - 000002DF]	Communications Port (COM6)
[000002E8 - 000002EF]	Communications Port (COM4)
[000002F8 - 000002FF]	Communications Port (COM2)
[00000376 - 00000376]	Secondary IDE Channel
[00000378 - 0000037F]	Printer Port (LPT1)
[000003B0 - 000003BB]	Intel(R) Graphics Media Accelerator 3150
[000003C0 - 000003DF]	Intel(R) Graphics Media Accelerator 3150
[000003E8 - 000003EF]	Communications Port (COM3)
[000003F6 - 000003F6]	Primary IDE Channel
[000003F8 - 000003FF]	Communications Port (COM1)
[00000442 - 00000451]	Motherboard resources
[00000480 - 000004BF]	Motherboard resources
[000004D0 - 000004D1]	Motherboard resources
[00000800 - 0000087F]	Motherboard resources
[00000A00 - 00000A1F]	Motherboard resources
[00000A20 - 00000A2F]	Motherboard resources
[00000A30 - 00000A3F]	Motherboard resources
[00000A79 - 00000A79]	ISAPNP Read Data Port
[00000D00 - 0000FFFF]	PCI bus
[0000D000 - 0000D0FF]	Realtek PCIe GBE Family Controller #9
[0000D000 - 0000DFFF]	PCI standard PCI-to-PCI bridge

	[00000087 - 00000087]	Direct memory access controller
	[00000088 - 00000088]	Motherboard resources
	[00000089 - 0000008B]	Direct memory access controller
	[0000008C - 0000008E]	Motherboard resources
	[0000008F - 0000008F]	Direct memory access controller
	[00000090 - 0000009F]	Motherboard resources
	[000000A0 - 000000A1]	Programmable interrupt controller
	[000000A2 - 000000BF]	Motherboard resources
	[000000C0 - 000000DF]	Direct memory access controller
	[000000E0 - 000000EF]	Motherboard resources
	[000000F0 - 000000FF]	Numeric data processor
	[00000170 - 00000177]	Secondary IDE Channel
	[000001F0 - 000001F7]	Primary IDE Channel
	[00000274 - 00000277]	ISAPNP Read Data Port
	[00000279 - 00000279]	ISAPNP Read Data Port
	[000002D0 - 000002D7]	Communications Port (COM5)
	[000002D8 - 000002DF]	Communications Port (COM6)
	[000002E8 - 000002EF]	Communications Port (COM4)
	[000002F8 - 000002FF]	Communications Port (COM2)
	[00000376 - 00000376]	Secondary IDE Channel
	[00000378 - 0000037F]	Printer Port (LPT1)
	[000003B0 - 000003BB]	Intel(R) Graphics Media Accelerator 3150
	[000003C0 - 000003DF]	Intel(R) Graphics Media Accelerator 3150
	[000003E8 - 000003EF]	Communications Port (COM3)
	[000003F6 - 000003F6]	Primary IDE Channel
	[000003F8 - 000003FF]	Communications Port (COM1)
	[00000442 - 00000451]	Motherboard resources
	[00000480 - 0000048F]	Motherboard resources
	[000004D0 - 000004D1]	Motherboard resources
	[00000800 - 0000087F]	Motherboard resources
	[00000A00 - 00000A1F]	Motherboard resources
	[00000A20 - 00000A2F]	Motherboard resources
	[00000A30 - 00000A3F]	Motherboard resources
	[00000A79 - 00000A79]	ISAPNP Read Data Port
	[00000D00 - 0000FFFF]	PCI bus
	[0000D000 - 0000D0FF]	Realtek PCIe GBE Family Controller #9
	[0000D000 - 0000DFFF]	PCI standard PCI-to-PCI bridge
	[0000E000 - 0000E0FF]	Realtek PCIe GBE Family Controller #8
	[0000E000 - 0000EFFF]	PCI standard PCI-to-PCI bridge
	[0000F000 - 0000F01F]	Intel(R) ICH8 Family SMBus Controller - 283E
	[0000F020 - 0000F03F]	Standard Universal PCI to USB Host Controller
	[0000F040 - 0000F05F]	Standard Universal PCI to USB Host Controller
	[0000F060 - 0000F07F]	Standard Universal PCI to USB Host Controller
	[0000F080 - 0000F09F]	Standard Universal PCI to USB Host Controller
	[0000F0A0 - 0000F0BF]	Standard Universal PCI to USB Host Controller
	[0000F0C0 - 0000F0CF]	Standard Dual Channel PCI IDE Controller
	[0000F0D0 - 0000F0DF]	Standard Dual Channel PCI IDE Controller
	[0000F0E0 - 0000F0E3]	Standard Dual Channel PCI IDE Controller
	[0000F0F0 - 0000F0F7]	Standard Dual Channel PCI IDE Controller
	[0000F100 - 0000F103]	Standard Dual Channel PCI IDE Controller
	[0000F110 - 0000F117]	Standard Dual Channel PCI IDE Controller
	[0000F120 - 0000F12F]	Standard Dual Channel PCI IDE Controller
	[0000F170 - 0000F177]	Intel(R) Graphics Media Accelerator 3150

## B.2 Memory Address Map

Address Range	Device
[000A0000 - 000BFFFF]	Intel(R) Graphics Media Accelerator 3150
[000A0000 - 000BFFFF]	PCI bus
[3F700000 - FFFFFFFF]	PCI bus
[D0000000 - DFFFFFFF]	Intel(R) Graphics Media Accelerator 3150
[E0000000 - E0003FFF]	Realtek PCIe GBE Family Controller #2
[E0000000 - E00FFFFF]	Intel(R) ICH8 Family PCI Express Root Port 2 - 2841
[E0004000 - E0004FFF]	Realtek PCIe GBE Family Controller #2
[E0100000 - E0103FFF]	Realtek PCIe GBE Family Controller
[E0100000 - E01FFFFF]	Intel(R) ICH8 Family PCI Express Root Port 1 - 283F
[E0104000 - E0104FFF]	Realtek PCIe GBE Family Controller
[F0000000 - F3FFFFFF]	System board
[FE900000 - FE9FFFFFF]	Intel(R) Graphics Media Accelerator 3150
[FEA00000 - FEA7FFFF]	Intel(R) Graphics Media Accelerator 3150
[FEA80000 - FEAFFFFFF]	Intel(R) Graphics Media Accelerator 3150
[FEB00000 - FEB03FFF]	Microsoft UAA Bus Driver for High Definition Audio
[FEB04000 - FEB040FF]	Intel(R) ICH8 Family SMBus Controller - 283E
[FEB05000 - FEB053FF]	Intel(R) ICH8 Family USB2 Enhanced Host Controller - 2836
[FEB06000 - FEB063FF]	Intel(R) ICH8 Family USB2 Enhanced Host Controller - 283A
[FEC00000 - FEC00FFF]	Motherboard resources
[FED00000 - FED003FF]	High precision event timer
[FED14000 - FED19FFF]	System board
[FED1C000 - FED1FFFF]	Motherboard resources
[FED20000 - FED8FFFF]	Motherboard resources
[FEE00000 - FEE00FFF]	Motherboard resources
[FFE00000 - FFFFFFFF]	Motherboard resources

### B.3 IRQ Mapping Chart

Interrupt request (IRQ)	
(ISA) 0	High precision event timer
(ISA) 1	Standard 101/102-Key or Microsoft Natural PS/2 Keyboard
(ISA) 3	Communications Port (COM2)
(ISA) 4	Communications Port (COM1)
(ISA) 8	High precision event timer
(ISA) 9	Microsoft ACPI-Compliant System
(ISA) 10	Communications Port (COM3)
(ISA) 10	Communications Port (COM4)
(ISA) 10	Communications Port (COM5)
(ISA) 10	Communications Port (COM6)
(ISA) 12	Microsoft PS/2 Mouse
(ISA) 13	Numeric data processor
(PCI) 7	Intel(R) ICH8 Family SMBus Controller - 283E
(PCI) 16	Intel(R) Graphics Media Accelerator 3150
(PCI) 16	Realtek PCIe GBE Family Controller #8
(PCI) 16	Standard Universal PCI to USB Host Controller
(PCI) 17	Realtek PCIe GBE Family Controller #9
(PCI) 18	Standard Dual Channel PCI IDE Controller
(PCI) 18	Standard Enhanced PCI to USB Host Controller
(PCI) 18	Standard Universal PCI to USB Host Controller
(PCI) 19	Standard Universal PCI to USB Host Controller
(PCI) 21	Microsoft UAA Bus Driver for High Definition Audio
(PCI) 21	Standard Universal PCI to USB Host Controller
(PCI) 22	PCI standard PCI-to-PCI bridge
(PCI) 23	PCI standard PCI-to-PCI bridge
(PCI) 23	Standard Enhanced PCI to USB Host Controller
(PCI) 23	Standard Universal PCI to USB Host Controller

### B.4 DMA Channel Assignments

Direct memory access (DMA)	
4	Direct memory access controller

Appendix

C

# Mating Connector

## C.1 List of Mating Connectors and Cables

The table notes mating connectors and available cables.

Connector Label	Function	Mating Connector		Available Cable	Cable P/N
		Vendor	Model No.		
CN1	Audio 2Watt Speaker output	CATCH	WAFER BOX-4Pin-180D- Pitch 2.5mm (CATCH.1191-700 -04S compatible)	N/A	N/A
CN2	LCD Inverter Connector	CATCH	2.0mm pitch 5 pin (CATCH HS- 5P-2.0 or compatible)	N/A	N/A
CN3	LVDS Connector	E-Call	Board-Wire Connector-30P- Pitch=1.25mm( E- call.0110-01-553- 300 or compatible)	N/A	N/A
CN4	LPT connector	CATCH	BOX Header 12*1P(CATCH .12 04-700-12SMP or compatible)	N/A	N/A
CN5	FAN Connector	CATCH	2.54mm Pitch 3 pins(CATCH 1190-700-03S or compatible)	N/A	N/A
CN6	Digital I/O Connector	CATCH	BOX HEADER. 5*2P.180D. (CATCH. 1147- 000-10-SS or compatible)	N/A	N/A
CN10	Front Panel Connector	HoBase	2.54mm pitch 10 pins(HOBASE 2541-2H-2X5 or compatible)	N/A	N/A

## Mini-ITX

## EMB-LN8T

COM1	RS-232/422/485 Serial Port Connector	HoBase	D-SUB 9 Connector (HoBase. DRD-9P or compatible)	N/A	N/A
COM2	RS-232/422/485 Serial Port Connector	CATCH	2.00mm Pitch 10 pins (CATCH 1147-000-10S or compatible)	Serial Port Cable	1701100206
COM3	RS-232 Serial Port Connector	CATCH	2.00mm Pitch 10 pins (CATCH 1147-000-10S or compatible)	Serial Port Cable	1701100206
COM4	RS-232 Serial Port Connector	CATCH	2.00mm Pitch 10 pins (CATCH 1147-000-10S or compatible)	Serial Port Cable	1701100206
COM5	RS-232 Serial Port Connector	CATCH	2.00mm Pitch 10 pins (CATCH 1147-000-10S or compatible)	Serial Port Cable	1701100206
COM6	RS-232 Serial Port Connector	CATCH	2.00mm Pitch 10 pins (CATCH 1147-000-10S or compatible)	Serial Port Cable	1701100206
USB3	USB5&6 Connector	CATCH	2.00mm Pitch 10 pins (CATCH H754-2x5 or compatible)	USB Cable	1709100208
USB4	USB7&8 Connector	CATCH	2.00mm Pitch 10 pins (CATCH H754-2x5 or compatible)	USB Cable	1709100208
VGA1	VGA Connector	Astron	D-SUB Connector 5P.90D (Astron. HDLH-B15-CFHN 1T-1-R or compatible)	N/A	N/A
LPT1	LPT port connector	CATCH	2.00mm Pitch 26 pins (CATCH 1147-000-26SS or compatible)	LPT cable	1701260200