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Embedded & Industrial Computing

Hardware Platforms for Embedded and Industrial Computing

LEC-7106 V1.0

User's Manual

Publication date:2014-05-29

About

About

Overview

Icon Descriptions

The icons are used in the manual to serve as an indication of interest topics or important messages. Below is a description of these icons:

NOTE: This check mark indicates that there is a note of interest and is something that you should pay special attention to while using the product.

WARNING: This exclamation point indicates that there is a caution or warning and it is something that could damage your property or product.

Online Resources

The listed websites are links to the on-line product information and technical support.

Resource	Website
Lanner	http://www.lannerinc.com
Product Resources	http://www.lannerinc.com/download-center/
RMA	http://eRMA.lannerinc.com

Copyright and Trademarks

Acknowledgement

Compliances

CE

This product has passed the CE test for environmental specifications. Test conditions for passing included the equipment being operated within an industrial enclosure. In order to protect the product from being damaged by ESD (Electrostatic Discharge) and EMI leakage, we strongly recommend the use of CE-compliant industrial enclosure products.

FCC Class A

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Table of Contents

Chapter 1: Introduction

Thank you for choosing the LEC-7106. The LEC-7106 features Intel Atom D525(dual core) and ICH8M chipset. It features a LAN port and a VGA port as well as audio ports (microphone-in/line-out). The system also features extra serial communication ports (a total of 4 COM ports) for a variety of industrial communications and applications.

The following highlights the functionalities of the LEC-7106 system:

- A VGA port powered by Intel Integrated Graphics Media Accelerator 3150
- One 10/100/1000 Mbps LAN
- Six USB 2.0 ports (four via external type A ports and two via internal pin headers)
- SATA HDD support
- A total of 4 serial RS-232 ports supporting automatic hardware flow Control
- Audio input and output through Mic-in and Line-out jack
- Featuring power switch through Phoenix contact for distant power on/off control
- One Mini-PCIe connector (comes with a SIM card reader) to support 3G/GPS Internet connection

System Specification

Processor Options		Intel® Atom™ D525 (1.8 GHz) CPU
Chipset		Intel® ICH8M
BIOS		AMI 16bit SPI UEFI BIOS
System Memory	Sockets	1 x 204-pin SO-DIMM socket
	Technology	DDR3 SDRAM 800MHz
	Max. Capacity	Up to 4 GB
USB		4x External TypeA USB 2.0, 2x Internal USB ports
Digital I/O		N/A
Expansion Bus		Mini-PCIe x 1: one with SIM card reader and USB 2.0 Signal
OS Support		Microsoft Window 7/7 Embedded, Windows XP Pro/XP Embedded, Linux Cent OS 5
Storage	HDD/SSD Support	1 x 2.5" HDD/SSD drive bay
	Expansion	1 x CF socket Type I/II, 2x SATA ports
Networking	LAN	1 x 10/100/1000 Mbps, Autosensing,RJ-45
	Controller	Intel i210AT x 1
Display	Graphics Controller	Intel® integrated Graphics Media Accelerator 3150
	Display Interface	VGA x 1 (up to 2048x1536)
LEDs		Power, HDD active, 3G active
Physical Characteristics	Housing	Aluminum
	Weight	1 kg
	Dimensions (WxHxD)	268 x 44 x 174 mm (10.55" x 1.73" x 6.85")
	Mounting Options	Rack, VESA, DIN-rail and Wall mount
Environment	Operation Temperature	-10~55°C (with Industrial grade components), -5~45°C (with Commercial grade components)
	Storage Temperature	-20~75°C
	Ambient Relative Humidity (non-condensing)	5 to 95% (non-condensing)
Power	Input Voltage	+12 V DC
	Power Consumption	TBD
	Connector	DC jack with lock
	AC Adapter	60W +12V @5A
Standard and Regulation	EMC	CE/FCC
	Green product	RoHS
Reliability	Alter tool	Built-in buzzer and RTC (real-time clock) with battery lithium backup
	Automatic Reboot Trigger	Watchdog Timer 1~255 level time interval system reset, software programmable
	MTBF	TBD

Chapter 1

Package Contents

Your package contains the following items:

- LEC-7106 Fanless Embedded System
- Serial-ATA Data Cable (P/N:080W1N0002001)
- 2-pin Female Terminal Block (P/N: 04AW20023Z101)
- Mini-PCIe module screws (P/N: 070W101000401)
- Drivers and User's Manual CD (P/N: S09OADA19H100)

Optional Accessories

The system has a variety of optional accessories including the power cords and Wi-Fi or 3G modules for extended capabilities. For details of these modules, visit:

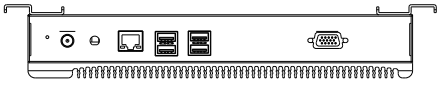
http://www.lannerinc.com/products/all-purpose-box-computers/industrial-automation/lec-7106

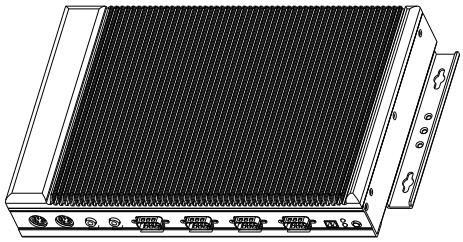
Chapter 2: System Components

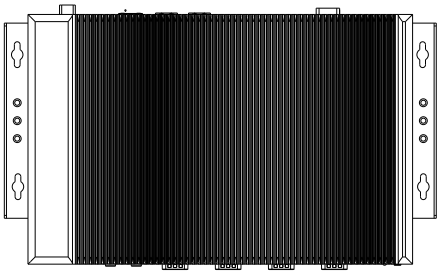
System Drawing

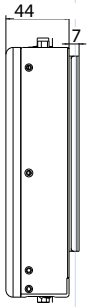
Mechanical dimensions of the LEC-7106

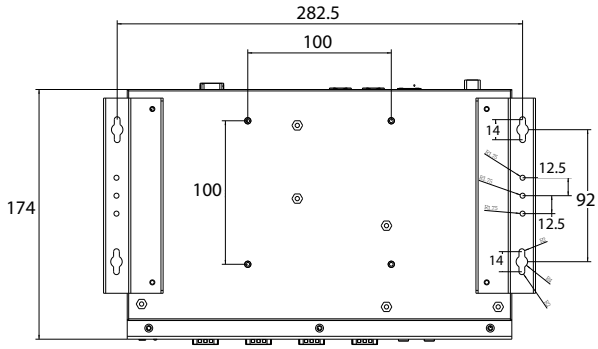
Unit: mm

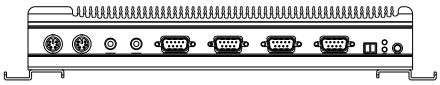






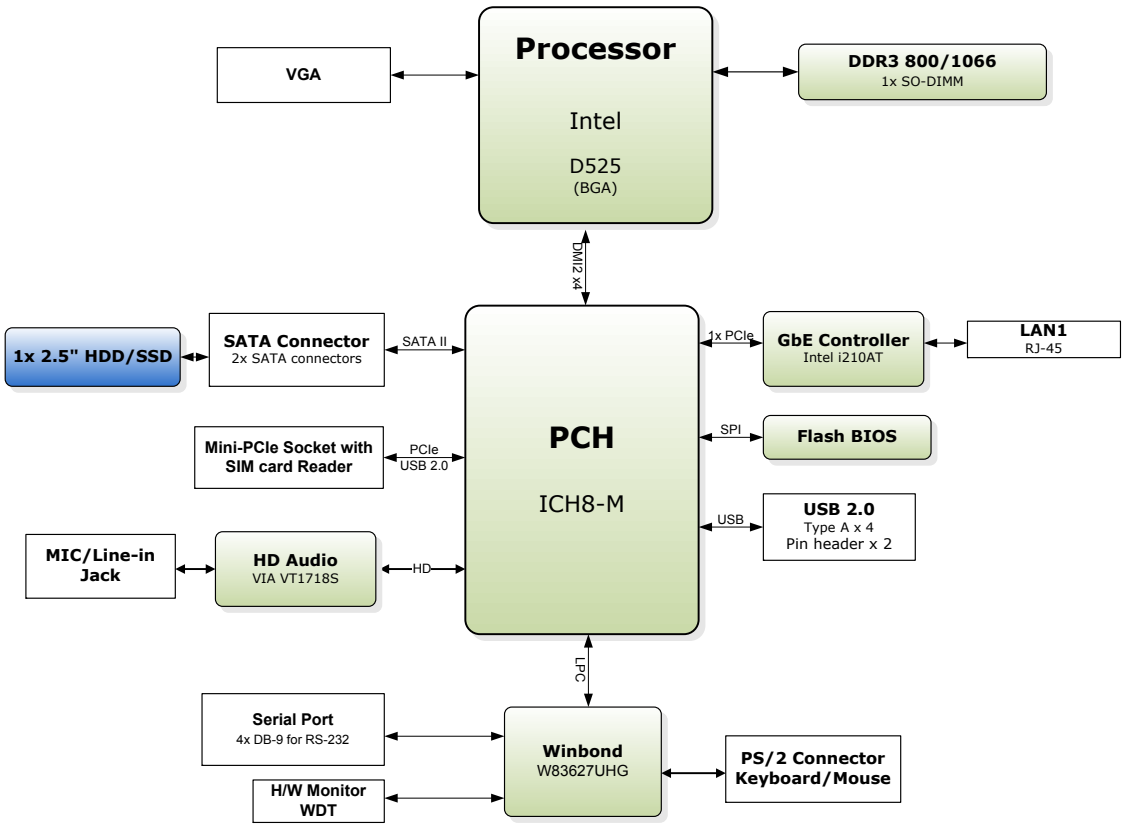




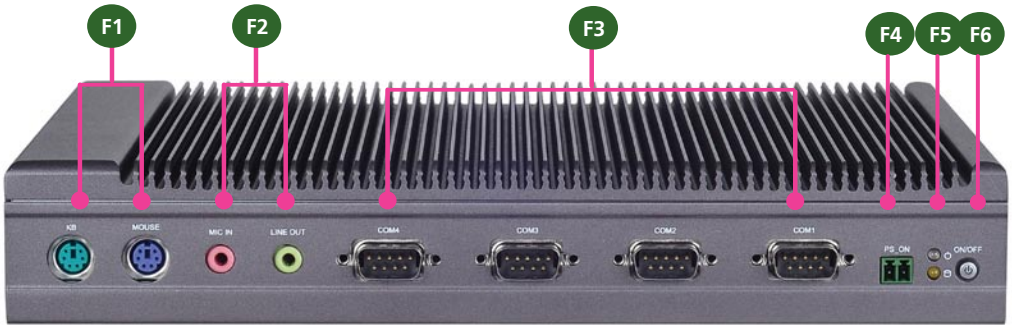


Block Diagram

The block diagram depicts the relationships among the interfaces and modules on the motherboard..

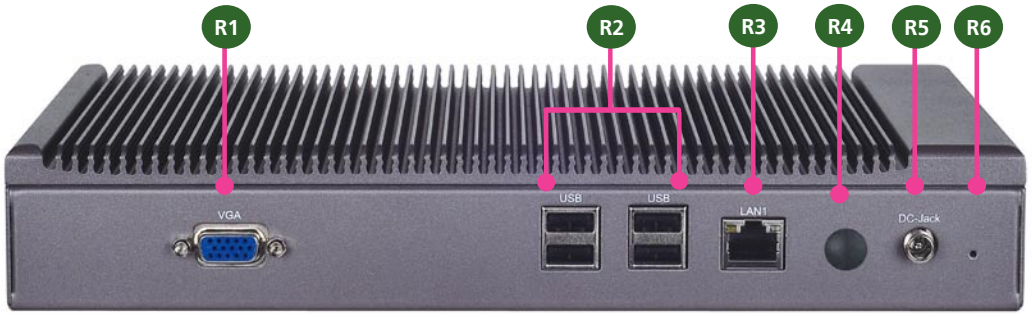


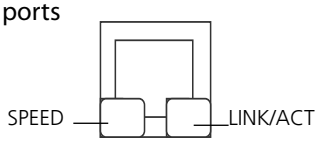
Front Components



Component	Description	Pin Definition Reference
F1 Keyboard and Mouse Connector	PS/2 keyboard and mouse connector	KB1, MS1 on page 14
F2 MIC IN/LINE OUT	An USB type A connector.	MIC1, LIN1 on page 13
F3 Serial Ports COM1~ COM4	Serial ports through the DB-9 connector. These ports support RS-232 communication.	COM1~COM4 on page 13
F4 Power-on Switch	A power-on switch through the Phoenix contact for distant power-on/off control	J12 on page 15
F5 Power LED (Green) and HDD (Yellow)	HDD • Blinking: data access activities • Off: no data access activities Status A programmable dual green/orange LED which can be used for indicating system status. Power • On: The computer is on. • Off: The computer is off .	
F6 Power Button with dual LED	ATX Power-on button with LEDs: Standby mode in Red; Power-on mode in Green	

Rear Components

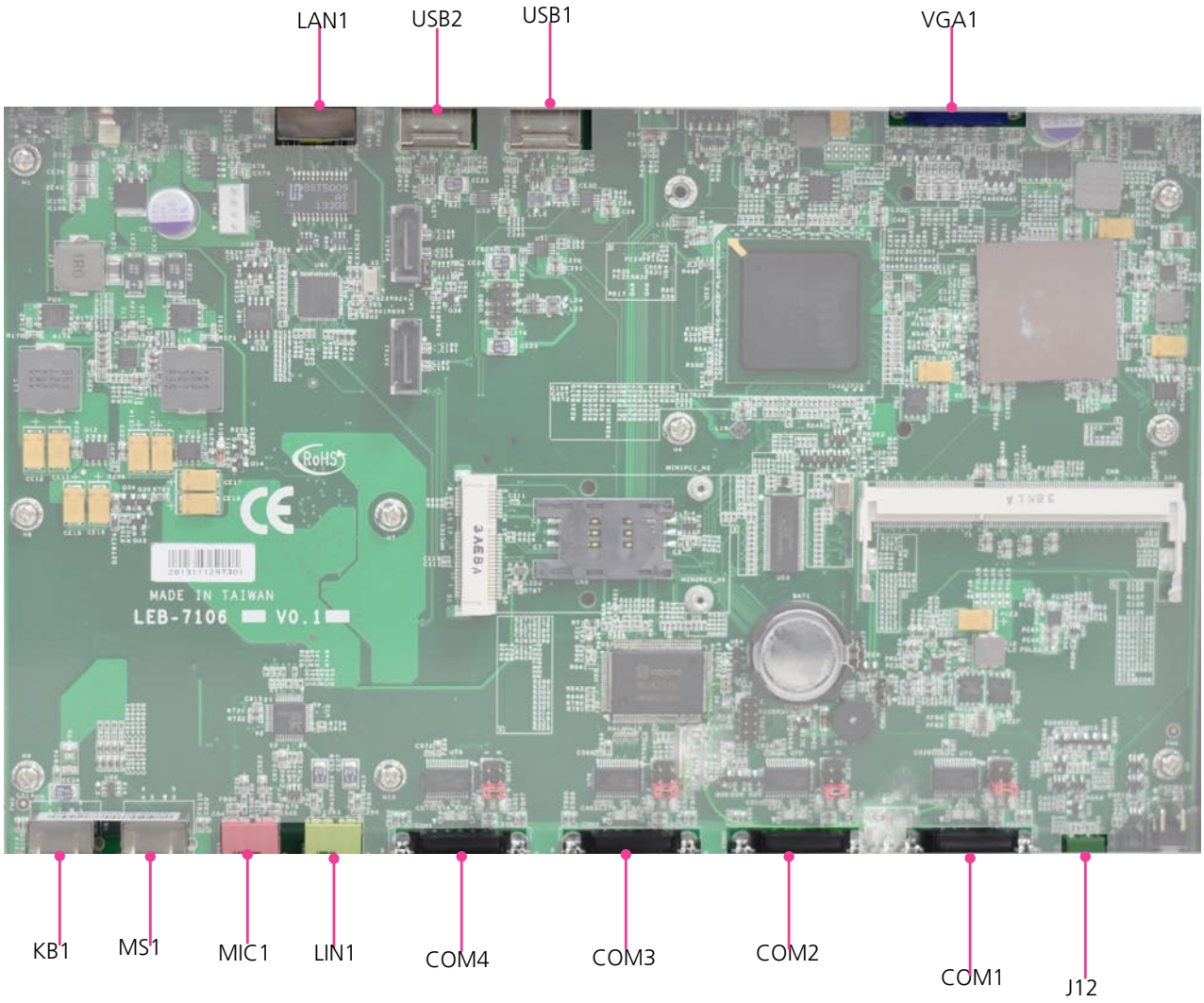


Component	Description	Pin Definition Reference
R1 VGA Port	The displays can support VGA up to 2048x1536 resolution.	VGA1 on page 14
R2 Four USB 2.0 Ports	An USB type A connector. In additional to these two ports, there are also 2 ports via internal pin headers.	USB1, USB2 on Page 15
R3 10/100/1000Mbps LAN ports 	One RJ-45 (network) jack with LED indicators as described below. The LAN port is provided by Intel i210AT. The i210AT supports PXE remote boot. LINK/ACT (Yellow) • On/Flashing: The port is linking and active in data transmission. • Off: The port is not linking. SPEED (Green/Amber) • Amber: The connection speed is 1000Mbps. • Green: The connection speed is 100Mbps • Off: The connection speed is 10Mbps.	
R4 Antenna Hole	Reserved for Antenna holes.	
R5 DC-In (power) Connector	DC +12V Power-in Connector. The LEC-7106 system supports screw-locked power plug which allows secure power connection.	
R6 Reset	Reset switch	RST1 on page 15

Chapter 3: Board Layout

External Connectors

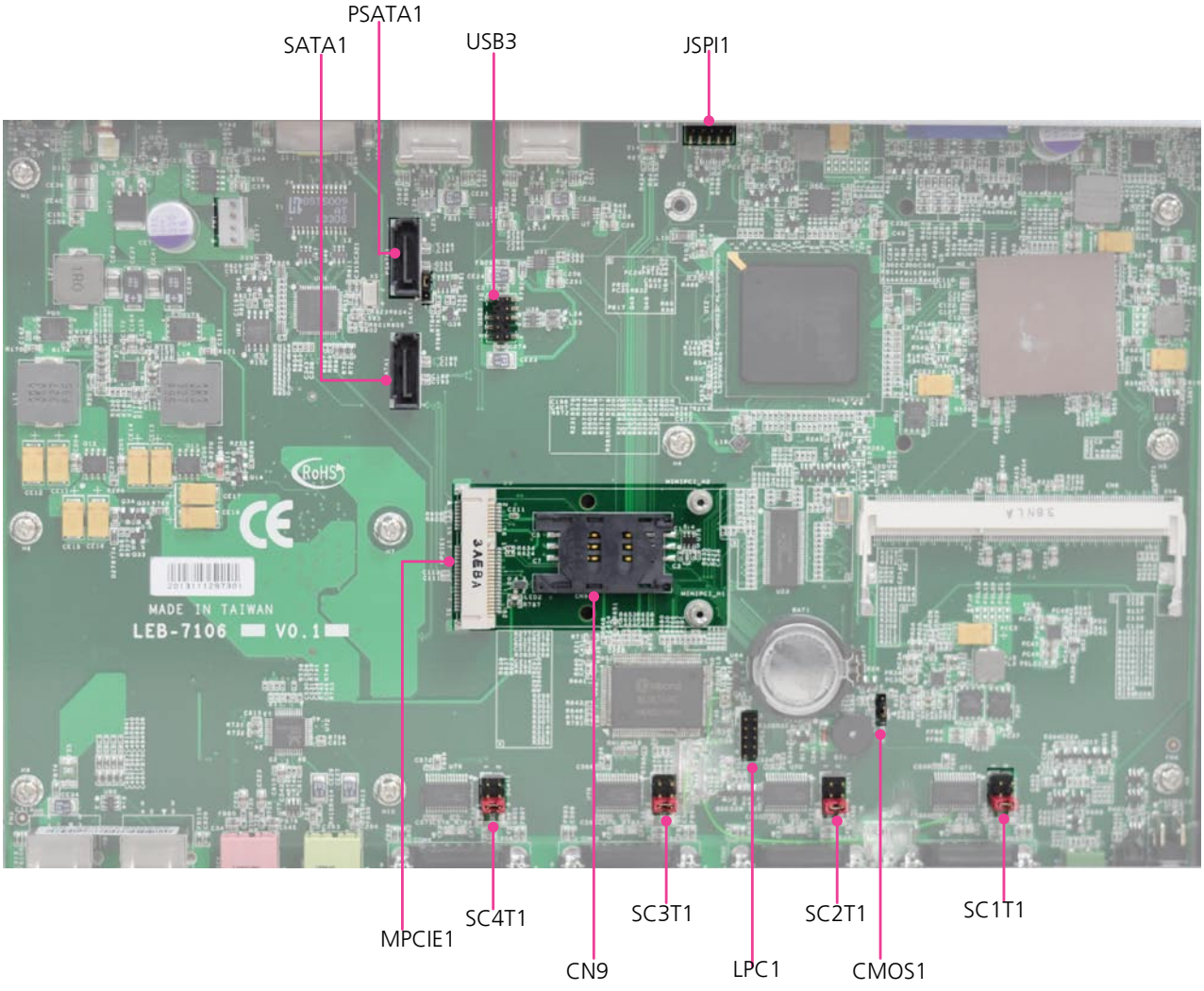
The following picture highlights the location of the external ports. Refer to the table 3.1 Connector List for more details.



LEB-7106

Internal Connectors and Jumpers

The following picture highlights the location of internal connectors and jumpers. Refer to the table 3.1 Connector List for more details.



LEB-7106

Connectors and Jumpers List

The tables below list the function of each of the board jumpers and connectors by labels shown in the above section. The next section in this chapter gives pin definitions and instructions on setting jumpers.

Table 3.1 Connector List for **the Main** Board

Labels	**Function**	**Pin Definition Reference Page**
COM1~COM4	RS-232 COM Ports	P13
CMOS1	Clear CMOS Jumper	P14
CN9	SIM Card Reader	P15
J12	Power Switch with Phoenix Contact Connector	P15
JSPI1	Serial Peripheral Interface	Reserved for factory use
KB1	Keyboard/Mouse Connector	P14
LIN1	Line-Out Audio Jack	P13
LPC1	Low-pin Cound Connector	Reserved for factory use
MIC1	Mic-in Audio Jack	P13
MPCIE1	Mini-PCIe Connector	P15
MS1	PS/2 Mouse Connector	P14
PW1	SATA Power	P14
RST1	Reset Button	P15
SATA1/PSATA1	Serial-ATA Connector	P14
SC1T1/SC2T1/SC3T1/SC4T1	COM1/COM2/COM3/COM4 Pin 9 Function Selection	P13
USB1/USB2	Dual USB Ports	P15
USB3	USB Pin Header	P15
VGA1	VGA Connector	P14

Jumper Settings

The Main Board

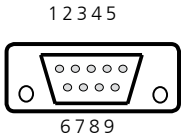
Microphone-in Audio Jack (MIC1)

Pin No.	Signal	Pin No.	Signal
1	GND_AUD	2	MIC_OUT_L
3	GND_AUD	4	GND_AUD
5	MIC_OUT_R		

Line-out Audio Port (LIN1)

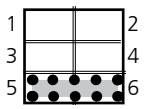
Pin No.	Signal	Pin No.	Signal
1	GND_AUD	2	FRONT_OUT_L
3	GND_AUD	4	GND_AUD
5	FRONT_OUT_R		

RS-232 Serial Port (COM1~COM4): It is an RS-232 port through the D-SUB9 connector.



Pin No.	Signal
	RS-232
1	DCD
2	RxD
3	TxD
4	DTR
5	GND
6	DSR
7	RTS
8	CTS
9	RI (ring indicator)

SC1T1/SC2T1/SC3T1/SC4T1: Select COM1/COM2/ COM3/COM4 Pin 9 (ring indicator) signal



Switch Combination / Protocol	SW1/SW4
+5V	1-2
+12V	3-4
RI (default)	5-6

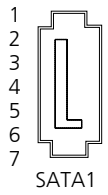
PS/2 Keyboard Connector (KB1)

Pin No.	Signal	Pin No.	Signal
1	KDAT_R	2	N/A
3	GND	4	VCC5_KB
5	KCLK_R	6	N/A

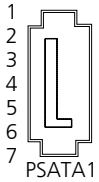
PS/2 Mouse Connector (MS1)

Pin No.	Signal	Pin No.	Signal
1	MDAT_R	2	N/A
3	GND	4	VCC5_KB
5	MCLK_R	6	N/A

Serial-ATA Connector (SATA1/PSATA1): It is for connecting a 2.5" harddisk to serve as your system's storage. It can support SATA II which features Data transfer rates up to 3.0 Gb/s (300 MB/s). Note that PSATA1 has power on pin 7 to support eSATA connector.

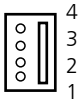


Pin No.	Function
1	GND
2	TX0_P
3	TX0_N
4	GND
5	RX0_N
6	RX0_P
7	GND



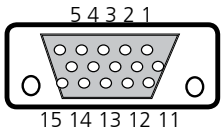
Pin No.	Function
1	GND
2	TX0_P
3	TX0_N
4	GND
5	RX0_N
6	RX0_P
7	VCC5_ SATADOM

4-pin Serial-ATA Power Connector (PW1): It is for connecting the SATA power cord.



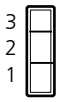
Pin No.	Function
1	VCC12_PS
2	GND
3	GND
4	VCC_HDD

VGA (VGA1)



Pin	Signal	Pin	Signal	Pin	Signal
1	Red Color Signal	6	GND	11	N/A
2	Green Color Signal	7	GND	12	DDC DAT
3	Blue Color Signal	8	GND	13	HSYNC
4	N/A	9	VCC5	14	VSYNC
5	CRT_ON	10	GND	15	DDC CLK

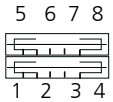
Clear CMOS jumper (CMOS1): It is for clearing the CMOS settings.



Pin No.	Pin Name
1-2	Normal (Default)
2-3	Clear CMOS

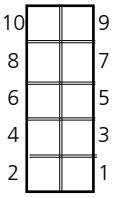
Dual USB Port Connector #0 and #1 (USB1):

Dual USB Port Connector #2 and #3 (USB2)



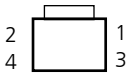
Pin No.	Pin Name
1	USB1_VCC5
2	USB1N/3N
3	USB1P/3P
4	GND
5	USB0_VCC5/ USB2_VCC5
6	USB0N/USB2N
7	USB0P/USB2P
8	GND

USB Pin Header (USB3)



Pin No.	Pin Name
1	USB4_VCC5
2	GND
3	N/A
4	USB5P
5	USB4N
6	USB5N
7	USB4P
8	N/A
9	GND
10	N/A

Reset Button (RST1)



Pin NO.	Description
1	RST_BTN
2	GND
3	GND
4	N/A

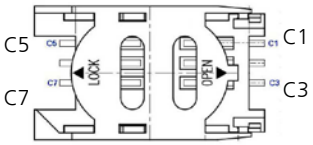
Power-on Switch through Phoenix Contact (J12): A Phoenix connector for distant power switch.

Pin No.	Pin Name
1	PWR_BTN_N
2	VCC5_SB

Mini PCI Express Connector (for 3G/GPS card with USB signal, MPCIE1):

PIN	Pin Name	PIN	Pin Name
1	WAKE#	2	VCC3.3
3	N/A	4	GND
5	N/A	6	VCC1.5
7	CLKREQ#	8	VREG_USIM
9	GND	10	UIM_DATA
11	CLK_PCIE_MINI_ N1	12	UIM_CLK
13	CLK_PCIE_MINI_P1	14	UIM_RESET
15	GND	16	UIM_VPP
17	RSV	18	GND
19	RSV	20	RF_KILL_N1
21	GND	22	PLTRST
23	PCIE_RX_N2	24	PCIE1_P24
25	PCIE_RX_P2	26	GND
27	GND	28	VCC1.5
29	GND	30	SMBCLK
31	PCIE_TX_N2	32	SMBDATA
33	PCIE_TX_P2	34	GND
35	GND	36	USB_N6
37	GND	38	USB_P6
39	VCC3.3	40	GND
41	VCC3.3	42	LED1_WWAN
43	GND	44	LED1_WLAN
45	RSV	46	LED1_WPAN
47	RSV	48	VCC1.5
49	RSV	50	GND
51	RSV	52	VCC3.3

SIM Card Reader (CN9)



Pin NO.	Signal	Pin NO.	Signal
C1	UIM_PWR	C5	GND
C2	UIM_RST#	C6	UIM_VPP
C3	UIM_CLK	C7	UIM_DATA

Chapter 4: Hardware Setup

Preparing the Hardware Installation

To access some components and perform certain service procedures, you must perform the following procedures first.

WARNING: To reduce the risk of personal injury, electric shock, or damage to the equipment, remove the power cord to remove power from the server. The front panel Power On/Standby button does not completely shut off system power. Portions of the power supply and some internal circuitry remain active until AC power is removed.

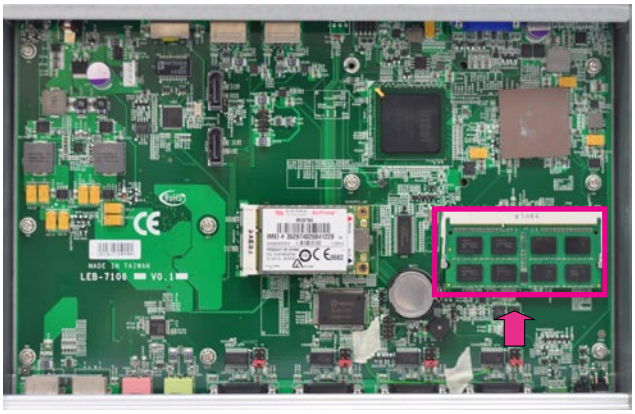
1. Unpower the LEC-7106 and remove the power cord.
2. Take off the 3 screws from the two sides of the LEC-7106 System.
3. Open the cover.

Installing the System Memory

The motherboard supports DDR3 memory to meet the higher bandwidth requirement of the latest operating system and Internet applications. It comes with one double data rate type three (DDR3) small outline dual in-line memory module (SO-DIMM) socket.

Note:

The motherboard can support up to 4 GB memory capacity in maximum.



Installing the Hard Disk

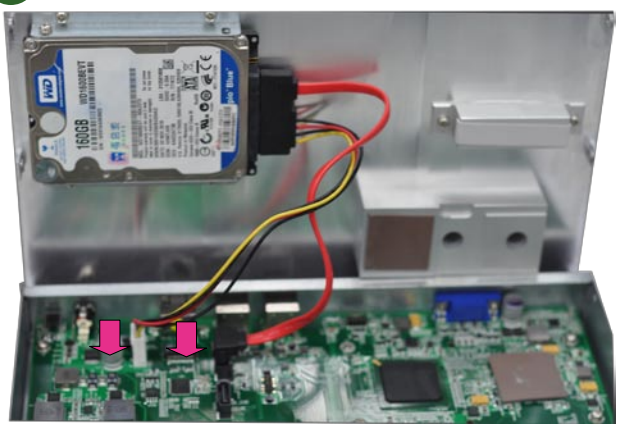
The system can accommodate one Serial-ATA disk. Follow these steps to install a hard disk into the LEC-7106:

1. Place hard disk alongside of the mounting bracket and align the holes of the hard disk with the mounting holes of the bracket
2. Attach the hard disk to the bracket with 4 mounting screws.
3. Connect the Serial-ATA power and data cables to the hard disk's connectors.
4. Attach the hard disk with the bracket back to the system.
5. Plug the Serial-ATA cables (power and data) to the Serial-ATA Connectors on the main board.

1

2

3



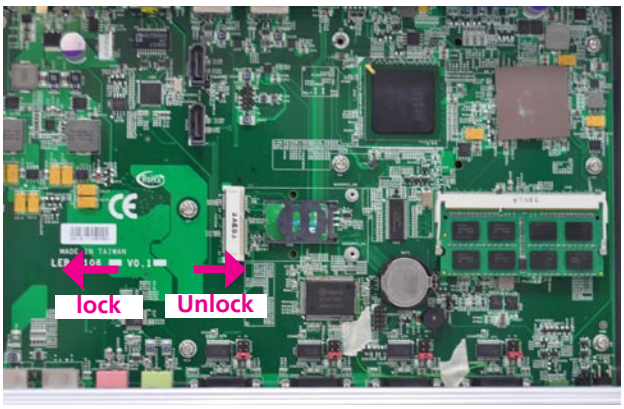
Installing the 3G SIM Card

1. Unlock the SIM card reader by sliding it outward and flip it up diagonally.
2. The angled corner of the SIM ensures that the card fits only the correct way in the tray. Make sure that the ICs will be in contact with the bottom of the reader.
3. Insert the SIM card into the reader diagonally. Close and lock the reader. You should feel a click when the SIM card is locked securely in the reader.

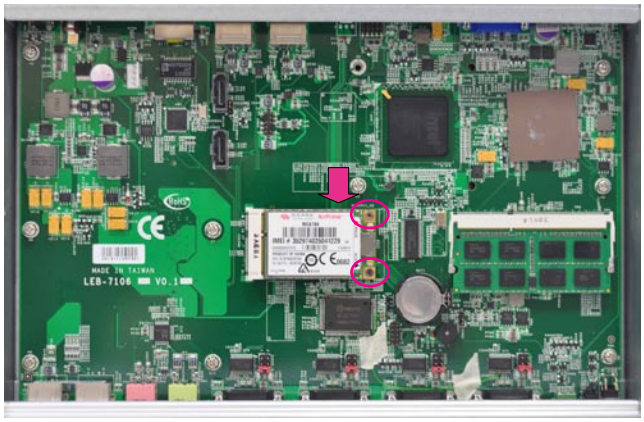
Installing the Wireless 3G Module

1. Align the wireless module's key with the Mini-PCIe slot notch.
2. Insert the wireless module into the connector diagonally.
3. Attach the wireless module to the slot with the screws (Use the Mini-PCIe module screws contained within the package).

Installing SIM Card



Installing 3G and Wi-Fi module on the PCIe socket



Appendix A: Programming Watchdog Timer

A watchdog timer is a piece of hardware that can be used to automatically detect system anomalies and reset the processor in case there are any problems. Generally speaking, a watchdog timer is based on a counter that counts down from an initial value to zero. The software selects the counter's initial value and periodically restarts it. Should the counter reach zero before the software restarts it, the software is presumed to be malfunctioning and the processor's reset signal is asserted. Thus, the processor will be restarted as if a human operator had cycled the power.

For sample watchdog code, see *Watch dog and DIO* folder in the *Driver and Manual CD*

Driver Installation

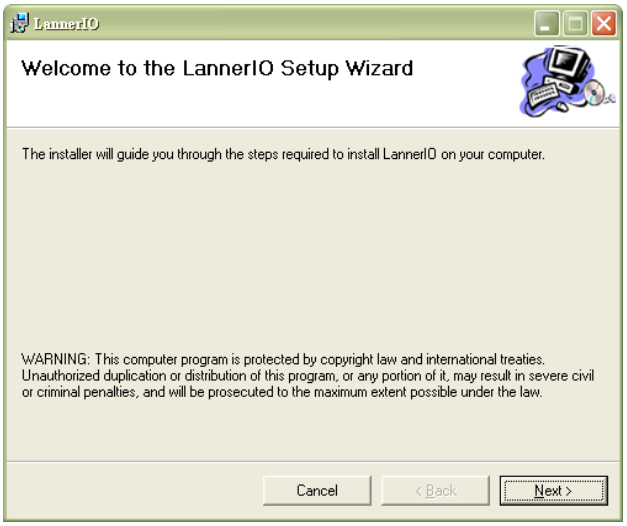
Before you could access or control the operation of the watchdog and Digital I/O functions, install the the L_IO driver which is the library and driver needed for Lanner General Purpose Input/Output interface or functions.

To install the L_IO driver:

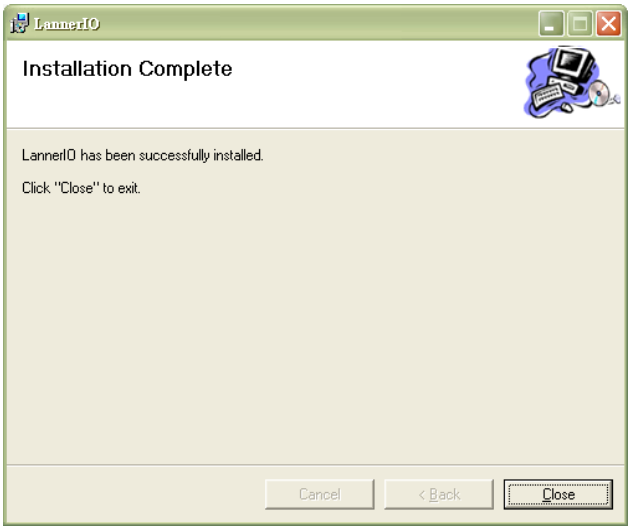
1. Restart the computer, and then log on with Administrator privilege.
2. Insert the Drivers and User's Manual CD to the USB-optical drive.
3. Browse the contents of the support CD to locate the file LannerIO v101.rar under the \WD_DIO\ folder and unzip the file.
4. Click the Setup program in the unzipped folder.

1. Click the Setup program.

2. The welcome screen appears. Click Next to proceed.

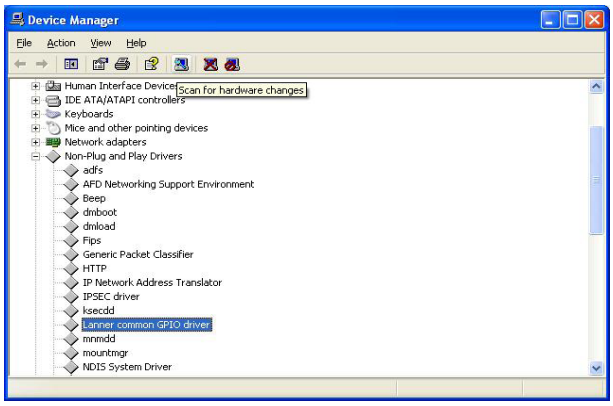


3. The installation process proceeds. Click Close when the process completes.



To verify the GPIO driver installation, do the following steps:

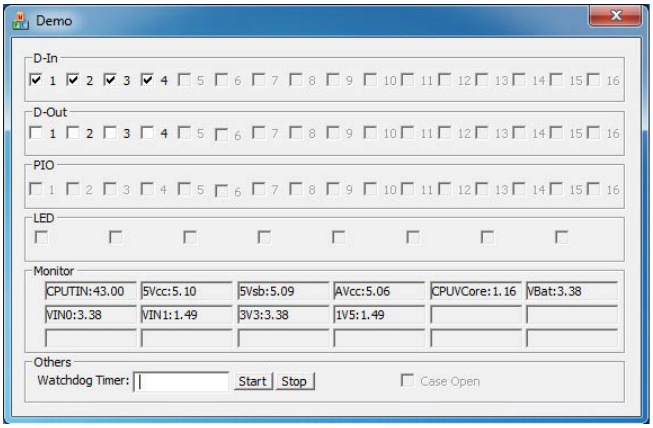
1. Right-click on the My Computer icon, and then select Properties form the menu.
2. Click the Hardware tab, then click the Device Manager button.
3. Select *View* from the menu and select *show hidden devices* .
4. The Lanner common GPIO driver should be listed under the Non-Plug and Play Drivers. If not, click the *San for hardware changes* button from the tool bar.



Sample Program

Via the Demo Program

Enter the number of seconds to start count down before the system can be reset. Press start to start the counter and stop to stop the counter.



Via the Command Line

Execute the executable file in the program folder, then enter the values from 1~255. The system will reboot automatically according to the time-out you set.

wd_tst --swt xxx (Set Watchdog Timer 1-255 seconds)

wd_tst[*] --start (Start Watchdog Timer)

wd_tst --stop (Stop Watchdog Timer)

Appendix B: Terms and Conditions

Warranty Policy

1. All products are under warranty against defects in materials and workmanship for a period of one year from the date of purchase.
2. The buyer will bear the return freight charges for goods returned for repair within the warranty period; whereas the manufacturer will bear the after service freight charges for goods returned to the user.
3. The buyer will pay for repair (for replaced components plus service time) and transportation charges (both ways) for items after the expiration of the warranty period.
4. If the RMA Service Request Form does not meet the stated requirement as listed on "RMA Service," RMA goods will be returned at customer's expense.
5. The following conditions are excluded from this warranty:

- Improper or inadequate maintenance by the customer
- Unauthorized modification, misuse, or reversed engineering of the product.
- Operation outside of the environmental specifications for the product.

RMA Service

Requesting a RMA#

6. To obtain a RMA number, simply fill out and fax the "RMA Request Form" to your supplier.
7. The customer is required to fill out the problem code as listed. If your problem is not among the codes listed, please write the symptom description in the remarks box.
8. Ship the defective unit(s) on freight prepaid terms. Use the original packing materials when possible.
9. Mark the RMA# clearly on the box.

Note: Customer is responsible for shipping damage(s) resulting from inadequate/loose packing of the defective unit(s). All RMA# are valid for 30 days only; RMA goods received after the effective RMA# period will be rejected.

Appendix B

RMA Service Request Form

When requesting RMA service, please fill out the following form. Without this form enclosed, your RMA cannot be processed.

RMA No:	Reasons to Return: □ Repair(Please include failure details) □ Testing Purpose
Company:	Contact Person:
Phone No.	Purchased Date:
Fax No.:	Applied Date:
Return Shipping Address: _____	
Shipping by: □ Air Freight □ Sea □ Express_____ □ Others:_____	

Item	Model Name	Serial Number	Configuration

Item	Problem Code	Failure Status

*Problem Code:

01:D.O.A.	07: BIOS Problem	13: SCSI	19: DIO
02: Second Time R.M.A.	08: Keyboard Controller Fail	14: LPT Port	20: Buzzer
03: CMOS Data Lost	09: Cache RMA Problem	15: PS2	21: Shut Down
04: FDC Fail	10: Memory Socket Bad	16: LAN	22: Panel Fail
05: HDC Fail	11: Hang Up Software	17: COM Port	23: CRT Fail
06: Bad Slot	12: Out Look Damage	18: Watchdog Timer	24: Others (Pls specify)

Request Party

Authorized Signature / Date

Confirmed By Supplier

Authorized Signature / Date