

Embedded & Industrial Computing

Hardware Platforms for Embedded and Industrial Computing



LEC-7230L
V1.1

User's Manual

Release date: 2016/11/28

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

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Compliances and Certification

CE Certification

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 Certification

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.

Revision History

Version	Date	Revision
1.0	2015/04/27	Official release
1.1	2015/12/28	Modified the DB9 COM pin definitions

EMC Notice

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 users will be required to correct the interference at their own expense.

Safety Guidelines

Follow these guidelines to ensure general safety:

- Keep the chassis area clear and dust-free before, during and after installation.
- Do not wear loose clothing or jewelry that could get caught in the chassis. Fasten your tie or scarf and roll up your sleeves.
- Wear safety glasses/goggles if you are working under any conditions that might be hazardous to your eyes.
- Do not perform any action that creates a potential hazard to people or makes the equipment unsafe.
- Disconnect all power by turning off the power and unplugging the power cord before installing or removing a chassis or working near power supplies
- Do not work alone if potentially hazardous conditions exist.
- Never assume that power is disconnected from a circuit; always check the circuit.

LITHIUM BATTERY CAUTION:

Risk of explosion could occur if battery is replaced by an incorrect type. Please dispose of used batteries according to the recycling instructions of your country.

- Installation only by a trained electrician or only by an electrically trained person who knows all the applied or related installation and device specifications..
- Do not carry the handle of power supplies when moving to other place.
- The machine can only be used in a fixed location such as labs or computer facilities.

Operating Safety

- Electrical equipment generates heat. Ambient air temperature may not be adequate to cool equipment to acceptable operating temperatures without adequate circulation. Be sure that the room in which you choose to operate your system has adequate air circulation.
- Ensure that the chassis cover is secure. The chassis design allows cooling air to circulate effectively. An open chassis permits air leaks, which may interrupt and redirect the flow of cooling air from internal components.

Electrostatic discharge (ESD) can damage equipment and impair electrical circuitry. ESD damage occurs when electronic components are improperly handled and can result in complete or intermittent failures. Be sure to follow ESD-prevention procedures when removing and replacing components to avoid these problems.

- Wear an ESD-preventive wrist strap, ensuring that it makes good skin contact. If no wrist strap is available, ground yourself by touching the metal part of the chassis.
- Periodically check the resistance value of the antistatic strap, which should be between 1 and 10 megohms (Mohms).

Rack Mounting Installation Environment Precaution

1. Elevated Operating Ambient - If installed in a closed or multi-unit rack assembly, the operating ambient temperature of the rack environment may be greater than room ambient. Therefore, consideration should be given to installing the equipment in an environment compatible with the maximum ambient temperature (T_{ma}) specified by the manufacturer.
2. Reduced Air Flow - Installation of the equipment in a rack should be such that the amount of air flow required for safe operation of the equipment is not compromised. Mechanical Loading - Mounting of the equipment in the rack should be such that a hazardous condition is not created due to uneven mechanical loading.
3. Mechanical Loading - Mounting of the equipment in the rack should be such that a hazardous condition is not achieved due to uneven mechanical loading.
4. Circuit Overloading - Consideration should be given to the connection of the equipment to the supply circuit and the effect that overloading of the circuits might have on over-current protection and supply wiring. Appropriate consideration of equipment nameplate ratings should be used when addressing this concern.
5. Reliable Earthing - Reliable earthing of rack-mounted equipment should be maintained. Particular attention should be given to supply connections other than direct connections to the branch circuit (e.g. use of power strips)."

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Chapter 1:

Introduction

Thank you for choosing Lanner LEC-7230L. This product is a cost effective embedded system which adopts Intel Bay-Trail CPU to provide a satisfying performance with lower power consumption structure for any embedded application. LEC-7230L's compact fan-less design incorporates many integrated multimedia and IO features such as video, audio, network, and serial functions for multiple purposes. This is one time-to-market system allowing easy installation and replacement for most systems.

The following highlight the features of the LEC-7230L system:

- Intel® Bay Trail CPU options: Celeron®J1900/N2930, or A™ E3845
- Robust Fan-less enclosure and compact size
- DDR3L memory support up to 8GB
- 1x Mini-PCIe with SIM-card reader
- Dual 10/100/1000Mbps Ethernet LAN ports
- USB ports: 1 x USB3.0 port and 2 x USB2.0 ports
- Serial COM ports: RS232/422/485 x2, Dlx2 and DOx2
- Storage: 1x CF card socket and 1x SATA port for 1x 2.5" SSD/HDD
- Single system power +12Vdc input

System Specifications

Processor Options		Intel® Celeron® J1900 (2M Cache, up to 2.42 GHz) (10W) Intel® Celeron® N2930 (2M Cache, up to 2.16 GHz) (7.5W) Intel® Atom™ E3845 (2M Cache, 1.91 GHz) (10W)
Chipset		None
BIOS		AMI SPI Flash BIOS
System Memory		1x 204 pin SO-DIMM socket to support up to 1333 8GB DDR3L SDRAM
USB		1x USB 3.0 Type-A port 2x USB 2.0 Type-A ports
Super I/O		1x LPC Super I/O Fintek F81865F
Expansion Bus		1 x Mini-PCIe socket (PCIexpress 1x and USB 2.0), with SIM card reader
OS Support		Windows: Windows Embedded S8, Windows Embedded 8.1, Industry Pro, Windows Embedded S7, Windows 7 Pro FES (32/64bit) Linux: Fedora 18 or later
Storage	HDD/SSD Support	1 x 2.5" HDD/SSD drive bay
	NAND Flash	1 x CompactFlash Type I/II socket
Networking	LAN	2 x 10/100/1000Mbps, Autosensing, RJ-45 ports
	Controller	2x Intel® Ethernet Controller I211-AT; Support PXE
Display	Graphics Controller	Intel® Integrated Graphics supports
	Outputs	HDMI: 1920x1080 VGA: 1600x1200 @60 24bpp
Serial		2x DB9 Male (COM1/2) supporting RS-232-/422/485
Audio	Ports	2x Audio I phone jack connectors for Mic and line-out
	Codec	Realtek ALC662 HD Audio
LEDs		1x triple-stack LEDs; Yellow for storage-access status, green for power-on status, the other green for 3G status if 3G mini-card exists
Buttons		1 x Power On/Off button 1 x Reset switch
Antenna		1x SMA Antenna slot for wireless connectivity
Physical Characteristics	Housing	Plastic
	Dimensions (WxHxD)	196 x 41 x 146.8, unit: mm
	Mounting Options	Rack, VESA, DIN-rail and Wall mount
Environment	Operating Temperature	For N2930/J1900 CPU: 0°C~40°C with industrial grade storage and memory For E3845 CPU: -20°C~40°C with industrial grade storage and memory
	Non-operating Temperature	-20°C~70°C
	Humidity (non-condensing)	5 to 95% (non-condensing)
Power	Input Voltage	1x DC Jack W/lock for DC +12Vdc input
	Connector	60W DC Jack w/Lock
	Adapter	External AC/DC Adapter
Certifications		CE, FCC, RoHS
Reliability	Thermal	Fanless
	WDT	Watchdog Timer 256 level time interval system reset, software programmable

Package Contents

Your package contains the following items:

- LEC-7230L Fanless Embedded System
- Power adapter
- Drivers and User's Manual CD

Ordering Information

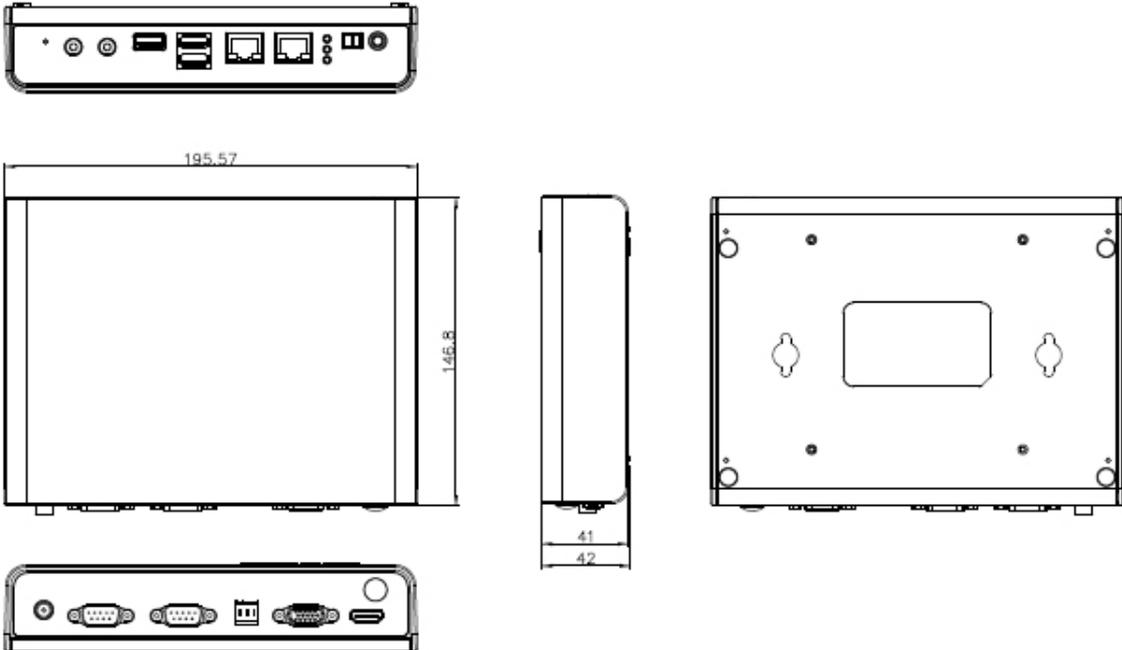
LEC-7230L-J11A	Fanless Industrial PC with Intel® Celeron® J1900 2.42 GHz Processor
LEC-7230L-N11A	Fanless Industrial PC with Intel® Celeron® N2930 2.16 GHz Processor
LEC-7230L-E51A	Fanless Industrial PC with Intel® ATOM® E3845 1.91 GHz Processor

Chapter 2: System Components

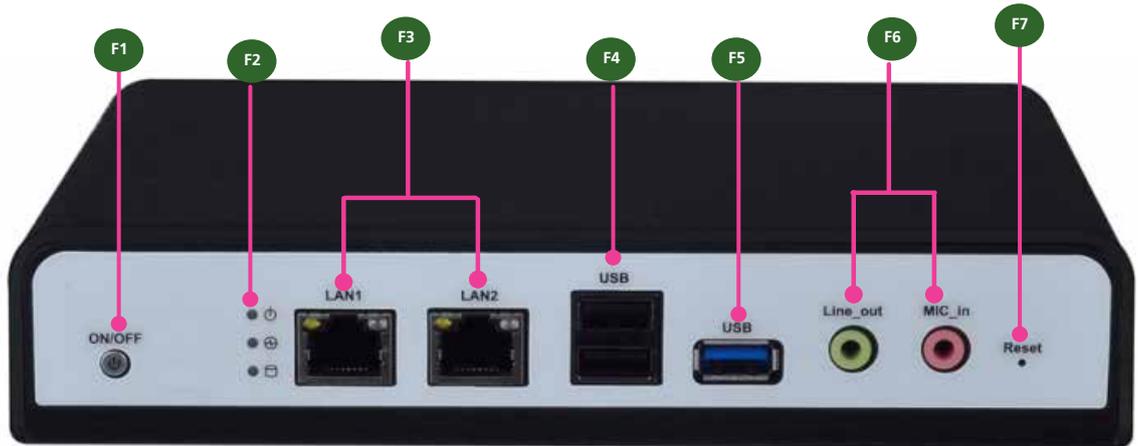
System Drawing

Mechanical dimensions of the LEC-7230L

Unit: mm

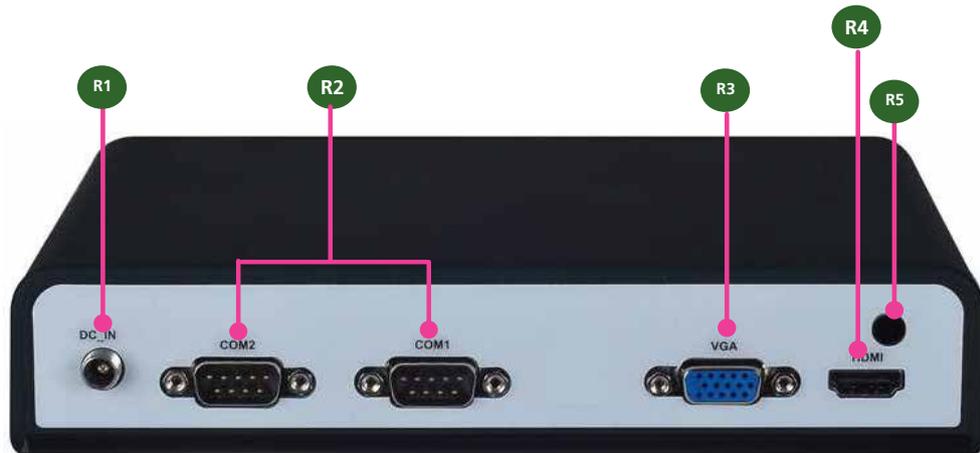


Front Components



Component	Description
F1 Power On/Off Button	Power the system on/off
F2 LED indicators	1 x triple-stacked LEDs <ul style="list-style-type: none"> • Yellow for storage access status • Green for power-on status • the other green for 3G/4G/LTE status if a 3G/4G/LTE module is installed
F3 Two LAN ports	2x RJ45 with LED connectors for 10/100/1000Mbps
F4 Double-stacked USB ports	2x USB 2.0 Type-A ports in double-stacked form
F5 USB 3.0 port	1 x USB 3.0 Type-A port
F6 Mic_In/Line_Out	1x green phone-jack connector for audio line-out 1x pink phone-jack connector for audio mic-in
F7 Reset	1 x Reset switch

Rear Components



Component	Description
R1 DC_IN	1x DC Jack W/lock for DC +12Vdc input
R2 Serial	2 x DB9 Serial COM ports supporting RS-232/422/485
R3 VGA	1 x VGA display port
R4 HDMI	1 x HDMI 1.4a output
R5 Antenna	1 x SMA Antenna slot for wireless connectivity



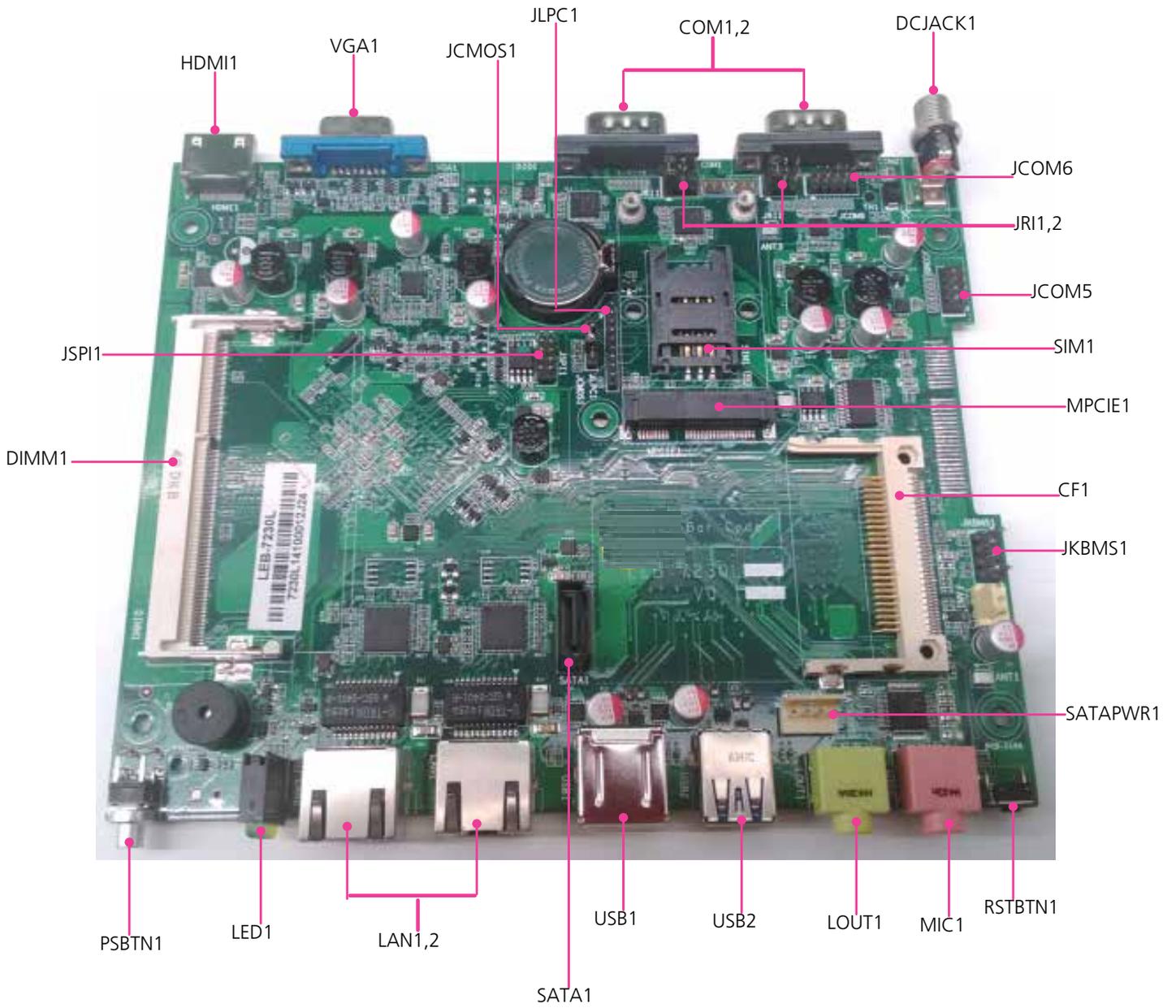
WARNING: Improper installation can cause injury or property damage.

For proper and safe operation use in field site with AC Power, please follow these instructions:

1. Securely plugged and locked the DC-Jack to the machine
2. Connect the AC adapter power cord into a standard 110v/220v AC outlet

Chapter 3: Board Layout

Jumpers & Connectors Locations



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.

Labels	Function
COM1/COM2	RS-232/422/485 Serial Ports
HDMI1	High-Definition Multimedia Interface Port
JCMOS1	Clear CMOS Jumper
JKBMS1	PS/2 Keyboard & Mouse Connector
JLPC1	Low-pin Count Interface
JRI1/2	COM1/COM2 Pin 9 Signal Selection
JSPI1	SPI ROM Interface (for debug use only)
MPCIE1	Mini-PCIe Connectors (with SIM1)
SATA1	Serial-ATA Connector (SATA1)
SATAPWR1	SATA HDD Power Connector
SIM1	SIM Card Reader
USB1	USB 2.0 Type A Dual Port
USB2	USB 3.0 Type A Port
VGA1	VGA Connector
LAN1,2	Ethernet LAN ports at 10/100/1000 Mbs
CF1	CompactFlash socket supporting Type I/II
MIC1/LOUT1	Mic In and Line Out audio ports

Jumper and Connectors Pinouts

JCOM5: RS-232 pin header



Pin No.	Signal
1	DCD#
2	DSR#
3	RXD
4	RTS#
5	TXD
6	CTS#
7	DTR#
8	RI#
9	GND

JCOM6: RS-232 pin header



Pin No.	Signal
1	DCD#
2	DSR#
3	RXD
4	RTS#
5	TXD
6	CTS#
7	DTR#
8	RI#
9	GND

JRI1: pin header for COM1 Pin9 signal selection



Pin	Signal
1-2 short (Default)	RI#
3-4 short	+5V
5-6 short	+12V

JRI2: pin header for COM2 Pin9 signal selection



Pin	Signal
1-2 short (Default)	RI#
3-4 short	+5V
5-6 short	+12V

JLPC1: LPC (Low-Pin-Count) pin header for debug uses



Pin	Signal	Pin	Signal
1	CLK	2	AD1
3	RESET#	4	AD0
5	FRAME#	6	+3.3V
7	AD3	8	GND
9	AD2	10	GND

JSPI1: SPI pin header

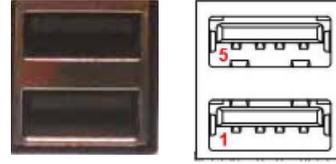


Pin	Signal	Pin	Signal
1	HOLD#	2	NC
3	CS#	4	+1.8V
5	MISO	6	NC
7	NC	8	CLK
9	GND	10	MOSI

JCMOS1: CMOS jumper to select "Normal" condition or to clear CMOS setting **USB1:** 1 x double-stacked USB 2.0 Type-A connectors



Pin	Signal
1-2 short (Default)	Normal
2-3 short	Clear CMOS



Pin	Signal	Pin	Signal
1	+5V	2	DATA1-
3	DATA1+	4	GND
5	+5V	6	DATA0-
7	DATA0+	8	GND

JKBMS1: PS/2 keyboard and mouse pin header



Pin	Signal	Pin	Signal
1	VCC	2	MSCLK
3	MSDATA	4	KEY
5	KBDATA	6	KEY
7	GND	8	KBCLK

USB2: 1 x USB 3.0 Type-A connector



Pin	Signal	Pin	Signal
1	+5V	2	DATA2-
3	DATA2+	4	GND
5	SSRX-	6	SSRX+
7	GND	8	SSTX-
9	SSTX+		

LAN1, 2: 2 x RJ-45 Ethernet LAN ports at 10/100/1000Mbps



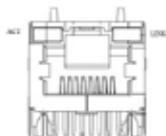
Pin	Signal	Pin	Signal
1	MDIO+	2	MDIO-
3	MDI1+	4	MD12+
5	MD12-	6	MDI1-
7	MDI3+	8	MDI3-

COM1, 2: 2 x DB9 Serial COM ports with RS-232/422/485



Pin No.	Signal
	RS-232
1	Data Carrier Detect (DCD #)
2	Receive Data (RXD)
3	Transmit Data (TXD)
4	Data Terminal Ready (DTR #)
5	Ground (GND)
6	Data Set Ready (DSR #)
7	Request To Send (RTS #)
8	Clear To Send (CTS #)
9	Ring Indicator (RI #)

LED indicators as described below:



LED Status/Color	Status	Description
ACT/Orange	Off	LAN link is not established
	On	LAN link is established
	Blinking	LAN activity is occurring
Link/Green/Orange	Off	10 Mbits/sec data rate is selected
	On/Green	100 Mbits/sec data rate is selected
	On/Orange	1000 Mbits/sec data rate is selected

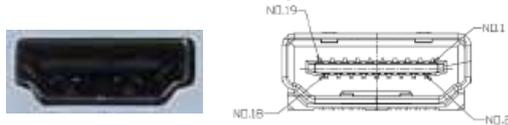
Pin	RS-422 Signal	RS-485 Signal
1	TXD-	DATA-
2	TXD+	DATA+
3	RXD+	
4	RXD-	
5	GND	GND

VGA1: 1 x VGA display port



Pin	Signal	Pin	Signal
1	RED	9	+5V
2	GREEN	10	GND
3	BLUE	11	NC
4	Reserve	12	DDC_DATA
5	GND	13	HSYNC
6	GND	14	VSYNC
7	GND	15	DDC_CLK
8	GND		

HDMI1: 1 X HDMI 1.4a display port



Pin	Signal	Pin	Signal
1	DATA2+	2	GND
3	DATA2-	4	DATA1+
5	GND	6	DATA1-
7	DATA0+	8	GND
9	DATA0-	10	CLK+
11	GND	12	CLK-
13	NC	14	NC
15	DDC CLK	16	DDC DAT
17	GND	18	HDMI_VCC
19	HPD		

CF1: 1 x CompactFlash Type I/II slot



Pin	Signal	Pin	Signal
1	GND	26	-CD1
2	D3	27	D11
3	D4	28	D12
4	D5	29	D13
5	D6	30	D14
6	D7	31	D15
7	-CS0	32	-CS1
8	A10 (GND)	33	-VS1
9	ATA_SEL#	34	-IORD
10	A9 (GND)	35	-IOWR
11	A8 (GND)	36	-WE
12	A7 (GND)	37	INTRQ
13	VCC	38	VCC
14	A6 (GND)	39	-CSEL
15	A5 (GND)	40	-VS2
16	A4 (GND)	41	-RESET
17	A3 (GND)	42	IORDY
18	A2	43	DMARQ
19	A1	44	-DDACK
20	A0	45	-DASP
21	D0	46	-PDIAG
22	D1	47	D8
23	D2	48	D9
24	-IOCS16	49	D10
25	-CD2	50	GND

MPCIE1: 1 x Mini-PCIe socket (PClexpress 1x and USB 2.0) with SIM-card reader for 3G mini-card module



Pin	Signal	Pin	Signal
1	WAKE#	2	+3.3Vaux
3	COEX1	4	GND
5	COEX2	6	+1.5V
7	CLKREQ#	8	UIM_PWR
9	GND	10	UIM_DATA
11	REFCLK-	12	UIM_CLK
13	REFCLK+	14	UIM_RESET
15	GND	16	UIM_VPP
Mechanical Key			
17	Reserve	18	GND
19	Reserve	20	W_DISABLE#
21	GND	22	PERST#
23	PERn0	24	+3.3Vaux
25	PERp0	26	GND
27	GND	28	+1.5V
29	GND	30	SMB_CLK
31	PETn0	32	SMB_DATA
33	PETp0	34	GND
35	GND	36	USB_D-
37	GND	38	USB_D+
39	+3.3Vaux	40	GND
41	+3.3Vaux	42	LED_WWAN#
43	GND	44	LED_WLAN#
45	Reserve	46	LED_WPAN#
47	Reserve	48	+1.5V
49	Reserve	50	GND
51	Reserve	52	+3.3Vaux

SATA1: 1 x SATA 7-pin signal connector for 2.5" storage device



Pin	Signal
1	GND
2	TXP
3	TXN
4	GND
5	RXN
6	RXP
7	GND

SATAPWR1: 1 x SATA 4-pin wafer connector for +5V DC output as the power segment for 2.5" storage device



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

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, please disconnect all the power sources/supplies. Portions of the power supply and some internal circuitry remain active until power is removed.

1. Turn LEC-7230L upside-down.
2. Loosen the 4 locking pads circled in the image below and remove them from the bottom cover.



3. Slide the compartment as directed by the arrow in the image below.



4. Turn back to the top cover.



5. Open the top cover as shown in the image below.



Installing the System Memory

Please follow the steps for installing the system memory module.

1. Align the memory module's key with the DIMM module.
2. Install the DIMM module as shown in the image below.



3. Press the module down until it is clipped in.



Note:

The system can support memory of 204-pin SO-DIMM 1333 DDR3L SDRAM memory up to 8GB. Please install the module compatible with this specification to ensure proper operations.

Installing CompactFlash card

Please follow the steps for installing CompactFlash card

1. Align the female connector of your CF card to the male connector of the CF slot on the motherboard.



2. Press the card into the slot until it is firmly seated.



Installing Mini-PCIe Module

1. Align the mini-PCIe module's key with the Mini-PCIe slot notch.
2. Insert the module diagonally as shown in the picture below.

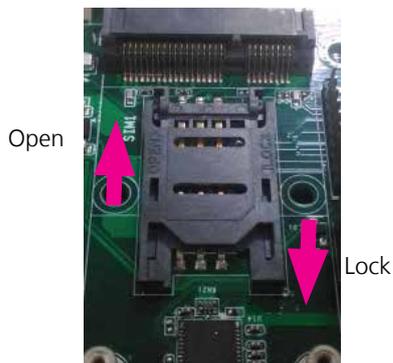


3. Press it down and lock the module with 2 screws.



Installing SIM Card

1. Locate the SIM card reader socket beside the mini-PCIe slot.
2. Slide the reader socket to open it. There is an arrow showing the direction to open.
3. Tilt the socket and insert the SIM card.
4. Press it down and slide the reader socket to lock it. There is an arrow showing the direction to lock.



Installing the Disk Drive

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

1. Locate the disk drive bay on the back side of the top black compartment.



2. Place the disk drive (HDD or SSD) as shown in the image below.



3. Lock the disk drive with 4 screws.



4. Connect a SATA cable to the disk drive and the motherboard.



5. Make sure the SATA cable connectors (7-pin SATA signal and 4-pin SATA power connectors) are firmly plugged into the corresponding connectors on the motherboard.



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* in the *Driver and Manual CD*



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.

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: <input type="checkbox"/> Repair (Please include failure details) <input type="checkbox"/> Testing Purpose
Company:	Contact Person:
Phone No.	Purchased Date:
Fax No.:	Applied Date:
Return Shipping Address: _____	
Shipping by: <input type="checkbox"/> Air Freight <input type="checkbox"/> Sea <input type="checkbox"/> Express _____	
<input type="checkbox"/> 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

Confirmed By Supplier

Authorized Signature / Date

Authorized Signature / Date