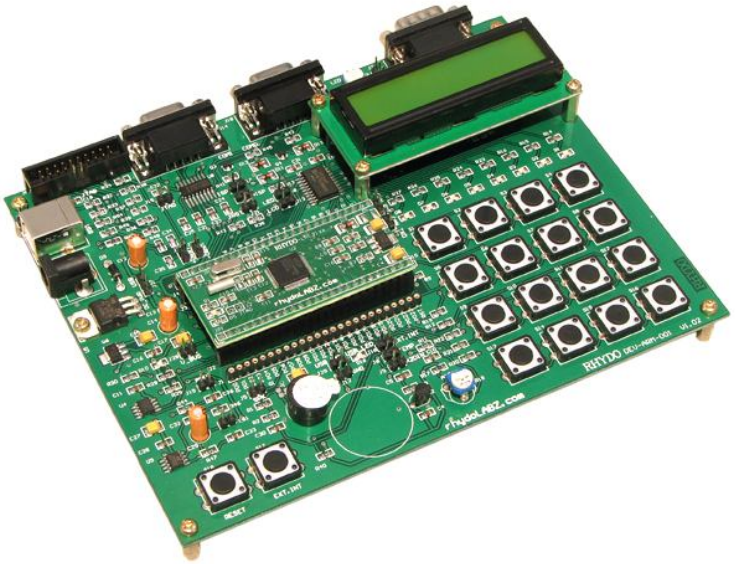
**Document** : Datasheet
**Date** : 11-Dec-07

**Model #** : DEV - 1127

# eCee NXP LPC 2148

# ARM Development Board

## Quick Start Guide



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# CHAPTER-1: OVERVIEW

The eCee LPC 2148 Development and Evaluation Board from RhydoLabz can be used to evaluate and demonstrate the capabilities of NXP LPC 2148 microcontrollers. The board (with a base board and header board) is designed for general purpose applications and includes a variety of hardware to exercise microcontroller peripherals. The LPC 2148 Board contains all hardware components that are required in a single-chip LPC 2148 system plus 2 COM ports for serial RS232 output and interfaces like Lcd, Buzzer, Keyboard, Temperature Sensor, Potentiometer, Led's, EEPROM etc .

## FEATURES

- Compact and Ready to use design
- Professional EMI/RFI Complaint PCB Layout Design for Noise Reduction

## BASE BOARD FEATURES

- Supports LPC2129/32/38 Header Boards
- Includes LPC2148 (with In-built **USB** Peripheral) Header Board
- No separate programmer required (On-Chip Boot loader)
- No Separate power adapter required (USB power source)
- Two RS-232 Interfaces (For direct connection to PC's Serial port)
- On Board Two Line LCD Display (2x16) (with jumper select option)
- On Board 8 LED Interface to test Port pin (with jumper select option)
- On Board Pot interface to ADC
- On Board Temperature Sensor Interface (Optional)
- On Board Buzzer Interface
- On Board 4x4 (16 Keys) Matrix Keyboard
- On Board $I^2C$ EEPROM
- On Board External Interrupt Button
- On Board Connector for PWM Output
- PWM controlled LCD backlight

- On Board Connector for Analog Output
- On Board Speaker Output
- LF Amplifier LM 386
- Adaptor (any standard 9-12V power supply) option
- On Board Power LED Indicator
- On Board Reset button
- All Port Pins available at Berge Strip
- On Board JTAG Connector for Debugging/Programming
- Power Supply Reverse Polarity Protection
- Three On Board DB9 Connectors (Two for UART and One for CAN)
- On Board USB Connector
- On Board 1 Amp Voltage Regulator
- On Board Connector for regulated 3V3 output
- On Board Connector for regulated 5V output
- Controller Area Network (CAN) transceiver (optional)
- Can be used as main board for developing applications

## HEADER BOARD FEATURES

- Easy to use DIP Package
- Includes NXP LPC 2148 Microcontroller with In-built **USB** Peripheral
- On Board Power LED Indicator
- On Board JTAG Jumper
- On Board 10 MHz Crystal Oscillator
- On Board 32.768 KHz Crystal for RTC
- On Board 3.3V Regulator
- On Board Power Supply de-Coupling Capacitors
- All Port Pins available at Berge Strip
- Header Module can be removed for developing your circuit

## eCee LPC 2148 PACKAGE INCLUDES

- Fully Assembled and Tested eCee LPC2148 Development board
- Software CDROM with
  - Schematic
  - Programming Software
  - Sample Hex Code
  - Example Codes

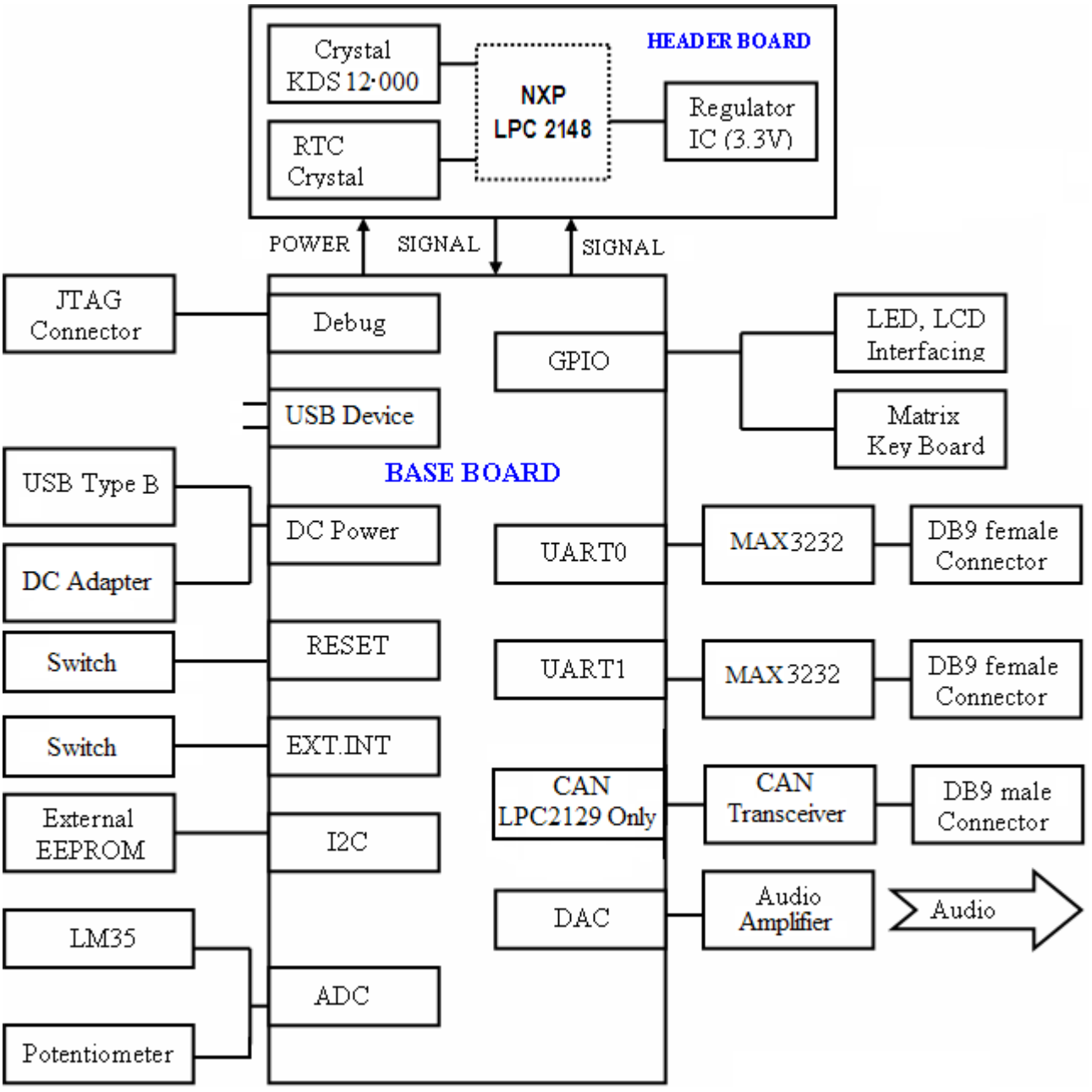
| | |
|---|---|
| Led Blinking | LCD Display |
| Matrix Keyboard | USB Communication |
| $I^2C$ Protocol | RTC Interfacing |
| Led Control with Timer | UART Communication |
| PWM Generation | Buzzer Interfacing |
| ADC Interfacing | DAC Interfacing |

## LPC 2148 SPECIFICATION

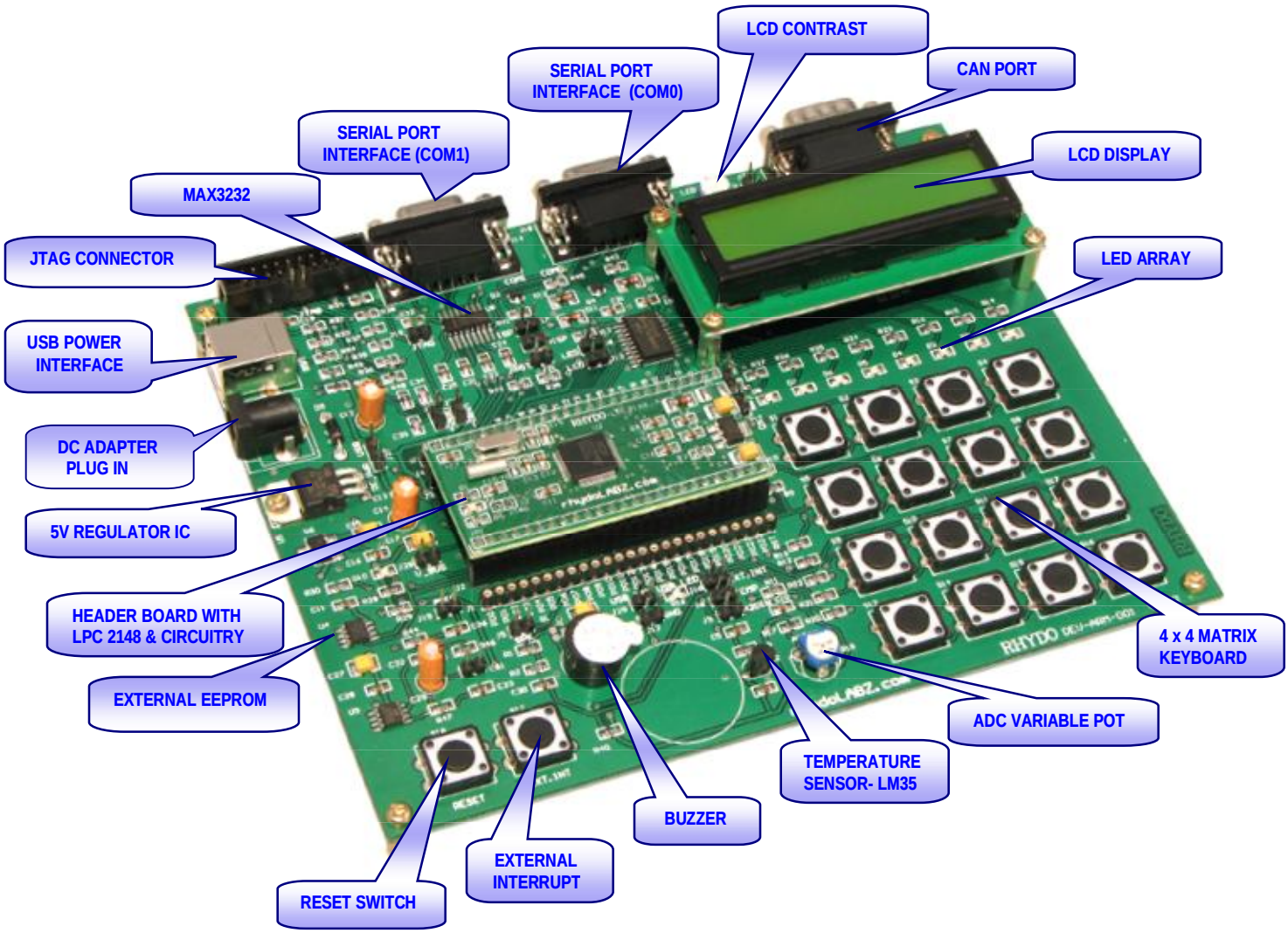
- High Performance 32-bit ARM7TDMI-S™ CPU
- 512 KB Programmable Flash Memory provides minimum of 10,000 erase/write cycles and 10 years of data-retention.
- 32 KB + 8 KB Data Memory (SRAM)
- Provides 8KB of on-chip RAM accessible to USB by DMA
- USB 2.0 Full-speed compliant device controller with 2 KB of endpoint RAM.
- In-System Programming/In-Application Programming (ISP/IAP) via on-chip boot loader software.
- Single Flash sector or full chip erase in 400 ms and programming of 256 bytes in 1 ms.
- EmbeddedICE RT and Embedded Trace interfaces offer real-time debugging with the on-chip RealMonitor software and high-speed tracing of instruction execution.
- Two 10-bit ADCs provide a total of 14 analog inputs, with conversion times as low as 2.44 us per channel.
- Single 10-bit DAC provides variable analog output.
- Two 32-bit Timers/External event counters.
- Four Capture and four Compare channels.
- PWM unit with six output pins.
- Low power Real-time clock with independent power and dedicated 32 kHz clock input.
- Multiple serial interfaces including two UARTs, two Fast $I^2C$ (400 kbit/s), SPI™ and SSP with buffering and variable data length capabilities.
- Vectored interrupt controller with configurable priorities and vector addresses.
- Up to 45 of 5 V tolerant general purpose I/O pins.
- Up to nine edge or level sensitive external interrupt pins.
- 60 MHz maximum CPU clock available from programmable on-chip Phase-Locked Loop (PLL) with settling time of 100us.
- On-chip integrated oscillator operates with external crystal in range of 1 MHz to 25 MHz
- Power saving modes include Idle and Power-down.
- Individual enable/disable of peripheral functions.
- Processor wake-up from Power-down mode via external interrupt.
- Single power supply chip with Power-On Reset (POR) and Brown-Out Detection (BOD:
- CPU Operating Voltage range of 3.0 V to 3.6 V

# CHAPTER-2: HARDWARE INTRODUCTION

## FUNCTION MODULE



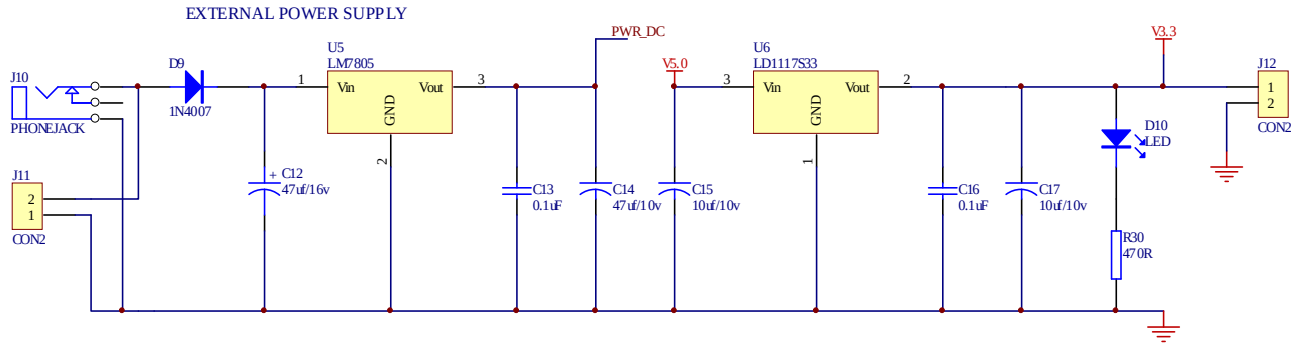
## INTERFACE OVERVIEW



## POWER SUPPLY

eCee NXP LPC 2148 Board has two power supplies; you can choose one of the following ways to supply power
(1) Through an Adaptor (any standard 9-12V power supply)
(2) Through the motherboard USB port

The external Power Supply circuit is given below:



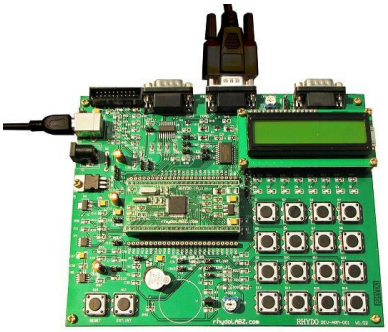

## CLOCK SOURCE

eCee NXP LPC 2148 evaluation board has two clock sources:

- 32.768 KHz as the RTC clock source
- 10 MHz as the MCU clock source

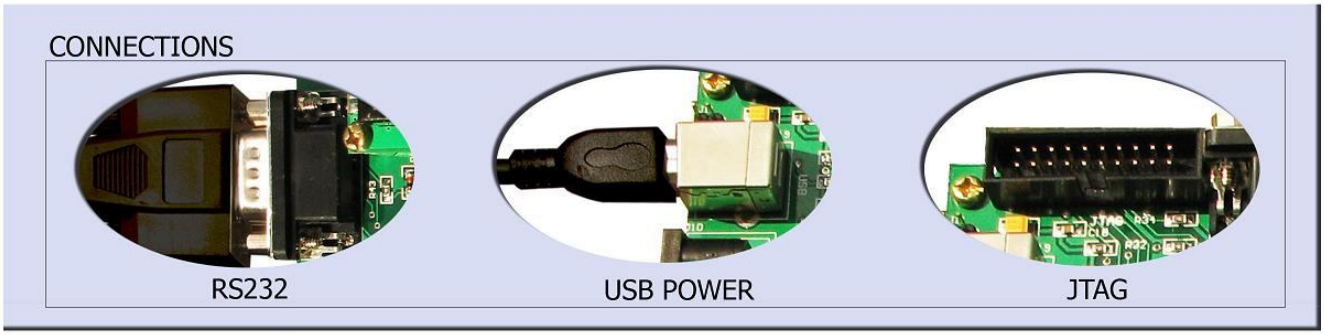
# CHAPTER-3 : INTERFACING eCee LPC 2148

## CONNECTING THE DEVELOPMENT BOARD



*The eCee LPC 2148 requires a 9V-12V adapter or USB connection for power and either a serial connection for In-system programming, or the JTAG connector.*
*Use LPC2000 Flash Utility Software at the PC side for programming through Serial port. Connect eCee LPC 2148 Development board to your PC using USB cable (for powering it) and serial cable (for In-serial programming) as shown in the figure.*

***Note**: Serial cable should be **connected to COM0** Port of the development board for downloading. **Corresponding jumpers** has to be inserted (see circuit diagram) for the functioning of each peripheral.*

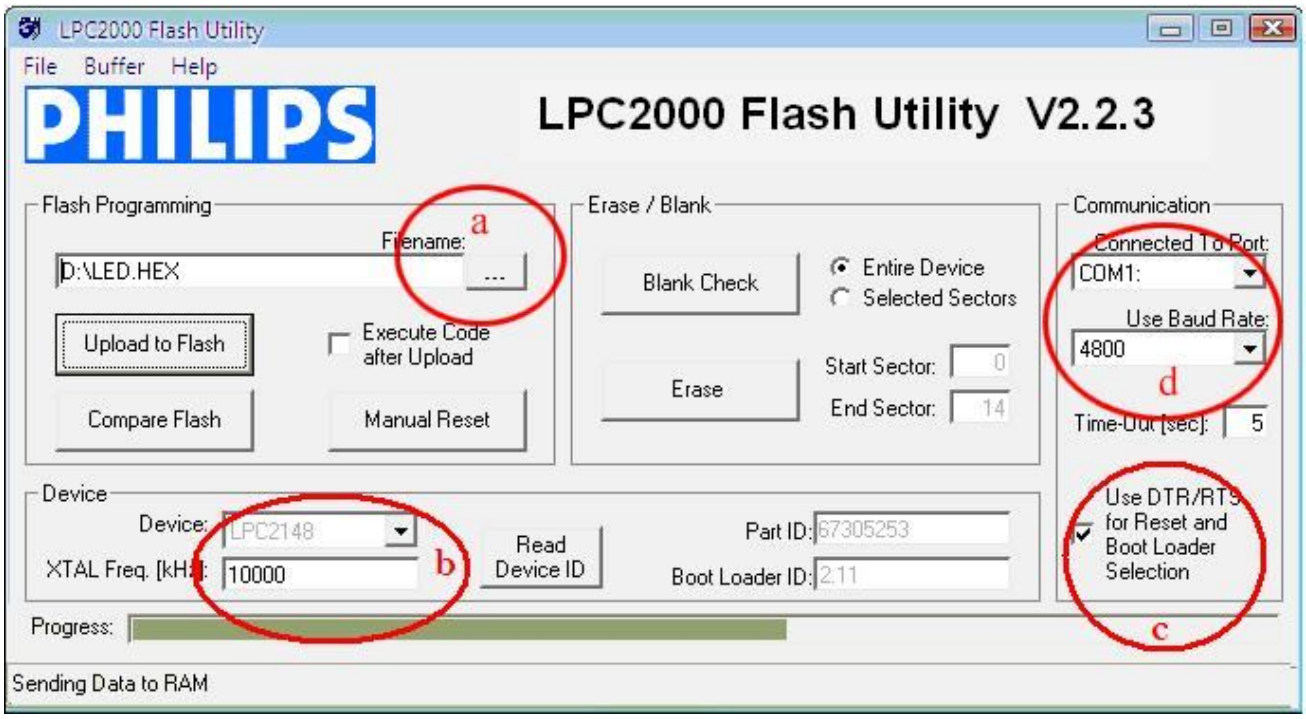


## PROGRAMMING STEPS

**eCee NXP LPC 2148 development board supports two modes of programming**

## I. AUTOMATIC MODE

*1. Configure LPC Flash Utility software at the PC side*
   *a. Browse your hex file here.*
   *b. Select Crystal frequency here.*
   *c. Enable DTR/RTS for Reset and boot loader selection.*
   *d. Select your COM port and Set baud rate (4800) here.*
*2. Connect system serial port to COM port of eCee LPC 2148 .*
*3. **Put jumper** on **RST(J21) , ISP(J17)** and Reset the board*
*4. Click "Read Device ID" and wait till Device Id is shown*
*5. Click "Upload to Flash" button in the flash utility software and wait till the programming is over.*
*6. Remove jumper on ISP and RST*
*7. Now Reset the development board*



## II. MANUAL MODE

*1. Configure LPC Flash Utility software at the PC side*
- *a. Browse your hex file here.*
- *b. Select your COM port and Set baud rate (4800) here.*
- *c. Disable DTR/RTS for Reset and boot loader selection.*

*2. Connect system serial port to COM port of eCee LPC 2148 .*
*3. **Put jumper** on **ISP(J17),*ISP(J20)***
*4. Click "Read Device ID"*
*5. The **software prompts you** to reset the development board.*
*6. Press Reset button (S18) and press OK*
*7. Wait till Device Id is shown*
*5. Click "Upload to Flash" button in the flash utility software and wait till the programming is over.*
*6. Remove jumper on ISP (J17),*ISP (J20)*
*7. Now Reset the development board*

## TECHNICAL SUPPORT

If you are experiencing a problem that is not described in this manual, please contact us. Our phone lines are open from 9:00 AM – 5.00 PM (*Indian Standard Time*) Monday through Saturday excluding holidays. Email can be sent to *support@rhydolabz.com*

## LIMITATIONS AND WARRANTEES

This product is intended for personal or lab experimental purpose and in no case should be used where it harmfully effect human and nature. No liability will be accepted by the publisher for any consequence of its use. Use of the product software and or hardware is with the understanding that any outcome whatsoever is at the users own risk. All products are tested for their best performance before shipping, still rhydoLABZ is offering One year Free service warranty (Components cost + Shipping cost will be charged from Customer).

## DISCLAIMER



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