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Making Prototyping Boards for the EFM32 kits

AN0031 - Application Note

Introduction

This application note describes how anyone can make their own custom prototyping boards that can be connected directly with the EFM32 kits. Both mechanical dimensions and PCB design files for development kit prototyping board and starter kit prototyping board are included. This application note is a good starting point if you want to create your own custom PCB designed to interface directly with an EFM32 kit.

This application note includes:

- This PDF document
- Source files (zip)
 - KiCad library.
 - Cadsoft Eagle library.



1 Introduction

This application note is intended to help users of one of the Energy Micro EFM32 kits create their own prototypes around the kit. This document includes drawings with the most important mechanical dimensions and connector placements. The included zip-file contains PCB (Printed Circuit Board) library files to help create extension boards that matches the dimensions and connector placement of the kits.

The included libraries are for KiCad and Eagle PCB design software suites. Both libraries are human readable text-files which can be used as source files for generating libraries for other PCB design software suites.

2 Starter Kits

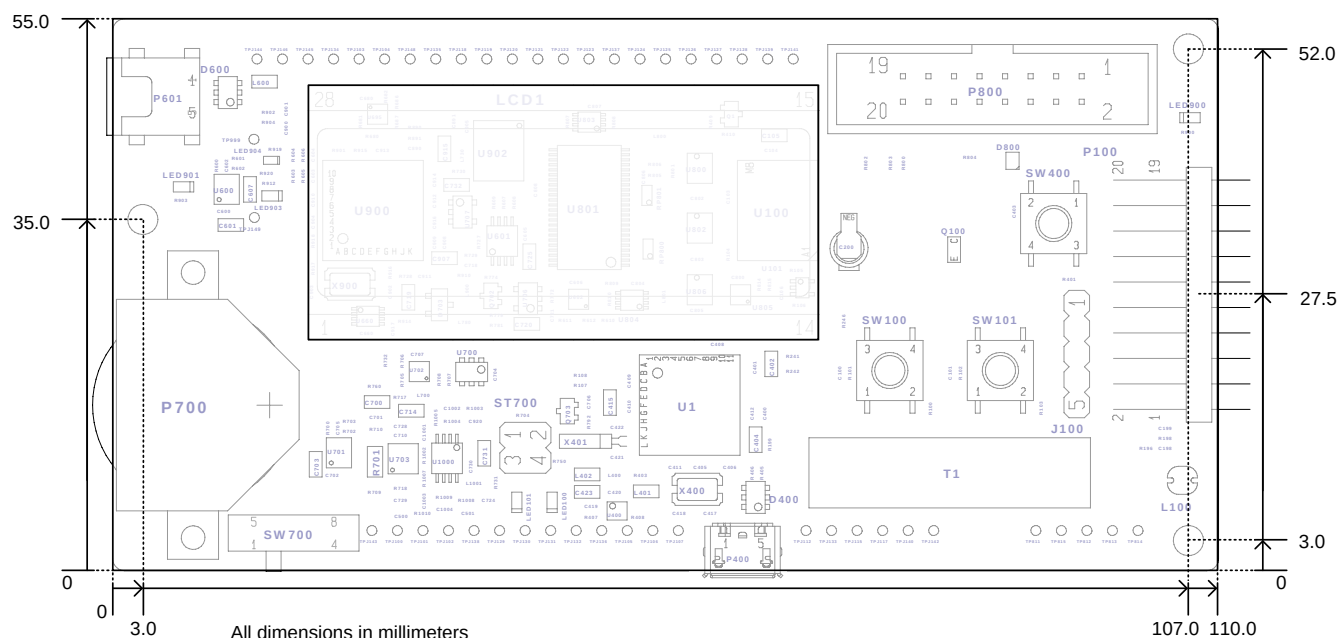
The starter kits has both an expansion connector and a set of header pin rows along the two longest edges of the kit. If the expansion connector on the right hand side of the kit contains all the pins a prototype need, this connector can be used to interface with external circuitry. One of the included PCB-library components have the pinout and footprint of a matching connector that can be used on an expansion board.

In some cases the pins needed are not included in the expansion connector and the pin-rows must be used. If many pins must be used it can often be beneficial to design an expansion shield PCB with pin rows that matches the placement of the pin rows on the starter kit. The included PCB-library contains schematic symbol and footprint for such an expansion PCB. The pin rows and mechanical holes are included in the PCB footprint.

2.1 Mechanical Dimensions

The mechanical dimensions of the starter kits are given in Figure 2.1 (p. 3). These measurements are the same for the STK G8xx/3300/3600/3700 starter kits.

Figure 2.1. Starter Kit Mechanical Dimensions



2.2 Custom STK Expansion Board

The pinout of the expansion connector varies slightly between the different starter kits. Make sure you select the correct schematic symbol. Power connections and ground do have the same pinout and are named and connected accordingly in the included library. The footprint of the expansion connector on the expansion board is intended for a through hole, female, right angle 2*10 connector.

A suitable connector is: Sullins Connector Solutions PPPC102LJBN-RC, digikey# S5563-ND.

2.3 Custom STK Shield Board

The STK has many pins that are not routed to the expansion connector. The additional pins are organized in two rows, one at the top and one at the bottom long edge of the kit. The pin rows are the standard 0.1" (inch) ~ 2.54 mm spaced type.

The included library contains a skeleton footprint and schematic symbol for a starter kit shield (efm32_stk_full_protoboard). It is intended to ease the design of a prototyping shield that can be plugged

into the header pin rows of the starter kits. Power and ground have the same pinout for all of the STK G8xx/3300/3600/3700 kits. Please check the pin out of your specific starter kit for other pins. Not all the starter kits have the same EFM32 pins at the same header pin location.

3 Development Kits

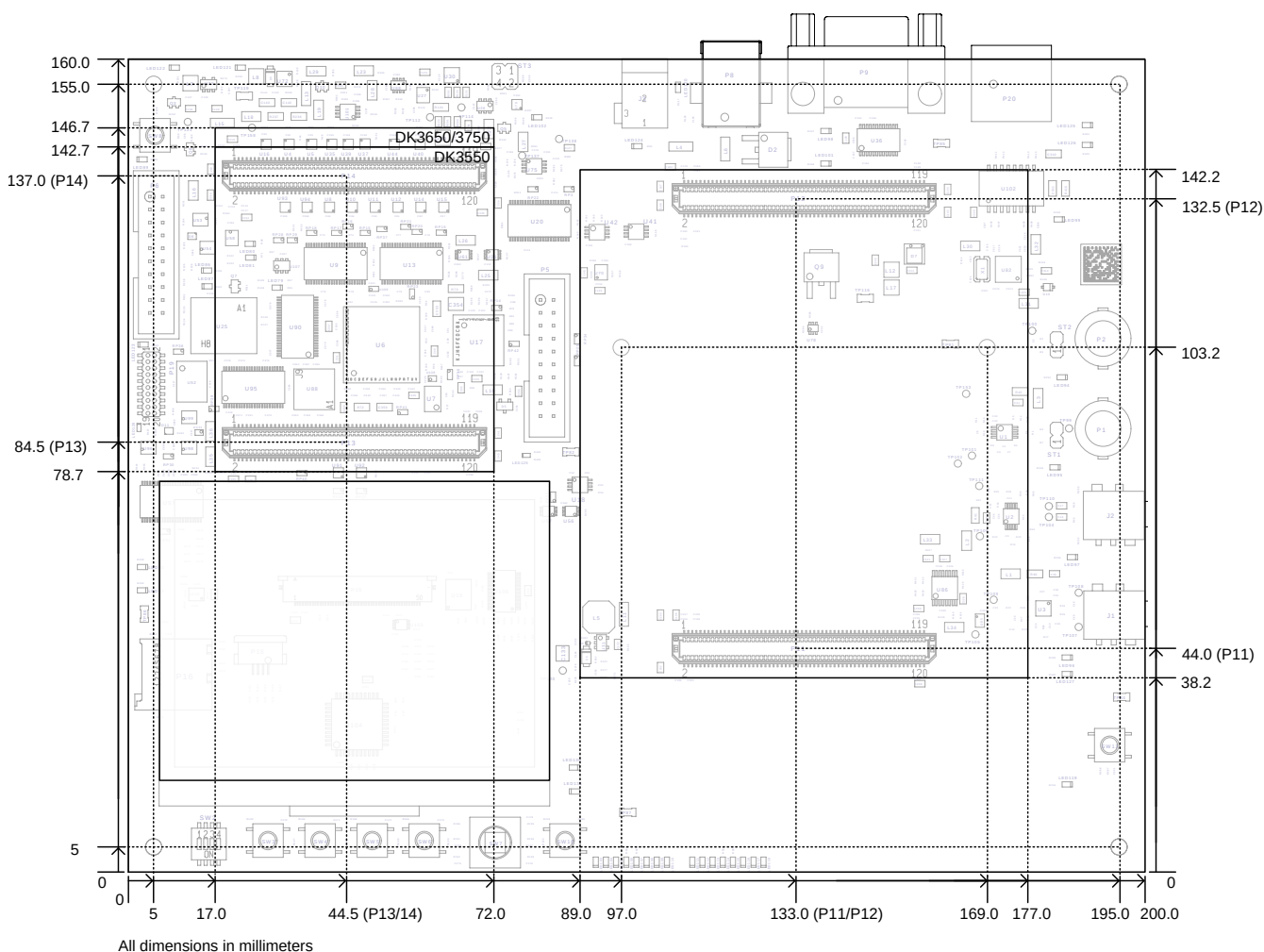
The development kits have two plugin module boards, one for the EFM32 MCU and one for a prototyping board. If the included prototyping board is unsuitable for a prototyping task, creating a custom plugin board for the prototype-connectors is possible. The lower connector (named EXP32_A) contains both power, ground and all EFM32 pins up to and including port E. The top connector (named EXP32_B) contains power, ground and some of the pins of port F.

The included PCB-library has a prototyping board skeleton component to simplify the design of a custom prototyping board. It consists of a schematic symbol with pin-names for the two connectors and a footprint with the correct placement of the connectors and the mechanical holes.

3.1 Mechanical Dimensions

The mechanical dimensions of the development kits are given in Figure 3.1 (p. 5). These measurements are the same for the DK 3550/3650/3750 kits.

Figure 3.1. Development Kit Mechanical Dimensions



3.2 Custom DK Protoboard

To make a custom prototype board, start with importing the prototype board skeleton symbol in the schematic view. Connect the pins of the connector symbols to other components in the design. Then add the protoboard skeleton footprint in the layout and place and route other components within the protoboard area.

The correct connector for the prototyping board is: Samtec BSE-060-01-L-D-A.

3.3 References on Using the PCB Libraries

To open and use the libraries in their respective software suites, please refer to the manual for the pcb design software:

Cadsoft Eagle manuals:

<http://www.cadsoftusa.com/training/manuals/>

KiCad manuals:

<http://www.kicad-pcb.org/display/KICAD/KiCad+Documentation>

4 Revision History

4.1 Revision 1.01

2013-09-03

New cover layout

4.2 Revision 1.00

2012-10-18

Initial revision.

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