Prototyping Environment for Education

Freescale's Microcontroller Student Learning Kit

Power Supply

CSM12C32
Module Board

Serial Cable

MC68HC908QY4P 16-pin DIP

Technical Training
Materials

MCU Project Board

CodeWarrior™
Development Tools
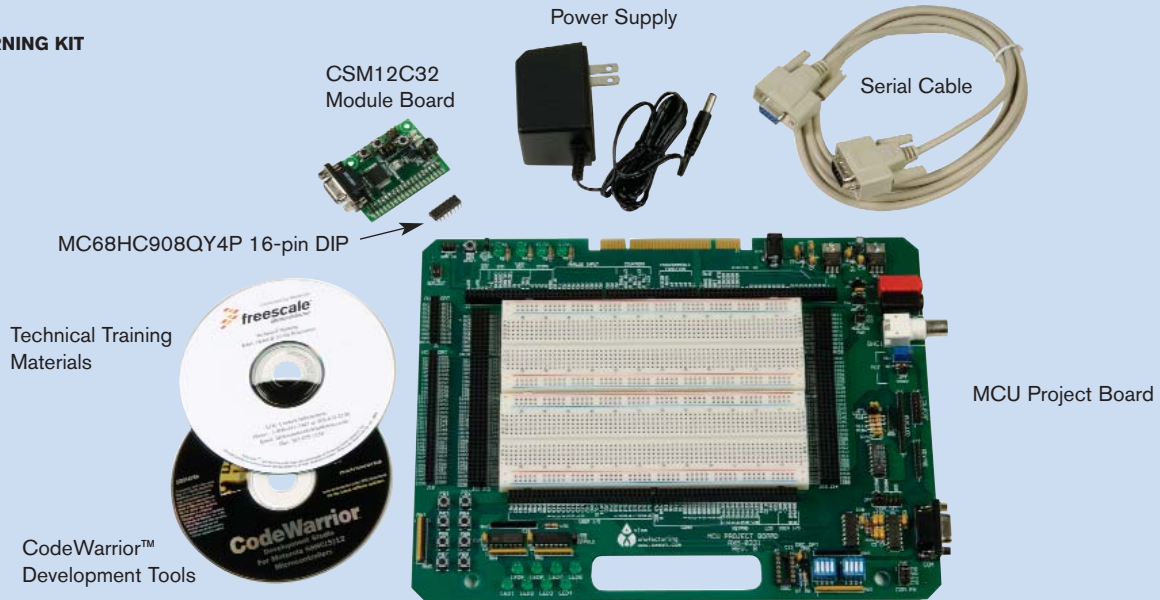
Overview

Freescale Semiconductor's Microcontroller (MCU) Student Learning Kit (SLK) contains a project board that can be used in conjunction with a wide selection of MCU Development boards and Metrowerks CodeWarrior™ development tools, providing flexible microcontroller interfacing and programming. With Freescale's MCU SLK you can start programming immediately because the kit comes with a CSM12C32 (HCS12) module board that plugs directly into the project board MCU connector, as well as MC68HC908QY4P (HC08) 16-pin, dual in-line package (DIP). For further assignment development, the project board MCU connector can accommodate two additional modular boards that can be

purchased separately—the CSM08RG60 (HCS08) and the CSM56F801 (DSP). Additionally, because of the wide selection of Freescale MCU boards that can be interfaced directly with ribbon cable, users will find the project board to be a versatile tool to use.

In addition to a MCU design environment, the project board can be used stand-alone for prototyping and testing non-microcontroller electronic circuits. Educators and students will find that the project board can be used for a diverse mix of coursework ranging from introductory electronics to programming microcontrollers to senior design projects.

Students can benefit from the reasonable price point and versatility of this product by purchasing their own kit to use throughout the span of their coursework. Another exciting advantage of Freescale's project board is that it has been specifically designed to be compatible with the National Instruments™ Educational Laboratory Virtual Instrumentation Suite (NI ELVIS). Compatibility with NI ELVIS, along with the inclusion of the CodeWarrior Development Tool Suite, provides an excellent integrated solution for using MCUs in an educational environment.

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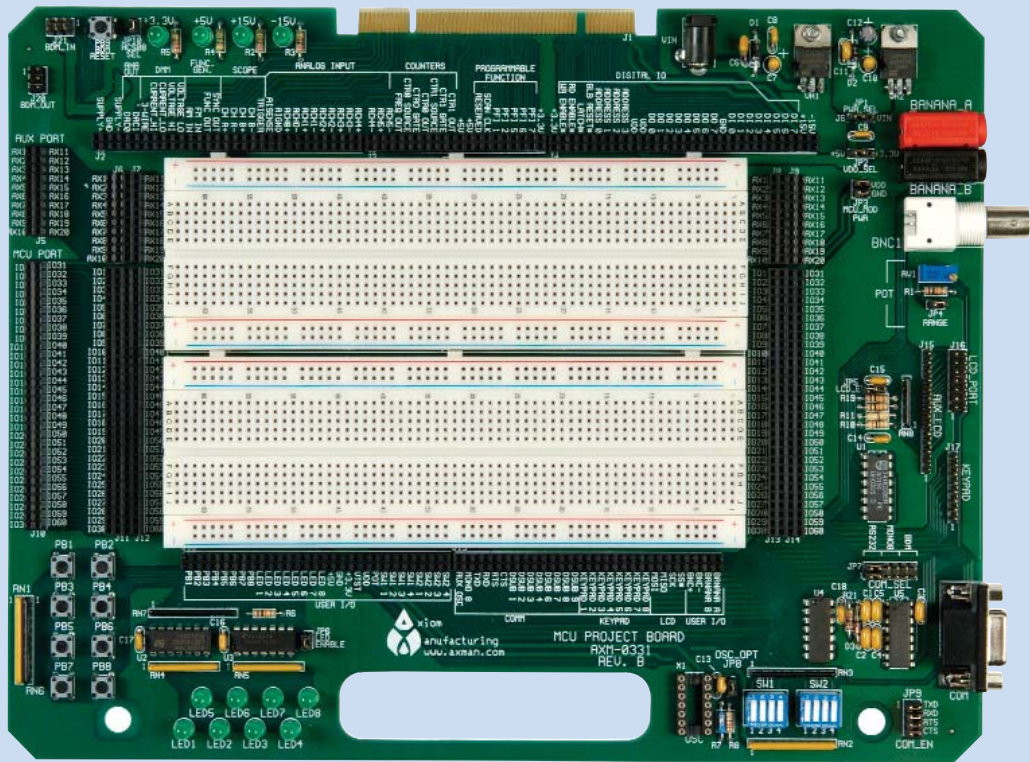
Project Board

Features

> Large prototyping area (27 sq. in.) with four power distribution strips

> MCU interface connector

- 20-pin AUX port connector

- 60-pin MCU port connector

> PCI-style card edge interface connector for use with NI ELVIS

> Signal breakout logically arranged around prototyping area

> Power input from included wall-plug transformer or from card edge connector

> +5V$_{DC}$ and +3.3V$_{DC}$ available to user

- Internal current limit prevents short-circuit damage

> User-selectable voltage to on-board logic devices

> User-selectable voltage output to MCU port connector

> Two banana connectors

> One BNC connector

> One multi-turn user potentiometer

> LCD module interface with serial-parallel shift register

- User option to enable/disable interface

> 8-pin keypad connector

> COM port

- 9-pin DSUB connector

- RS-232 interface with transceiver

- Option jumpers enable RS-232 signals to transceiver

› MON08 interface port

› BDM communications port

- Access to all COM signals at signal breakout connector

> Eight user DIP switches: active high

> Socket for optional crystal oscillator

- User-selectable output amplitude: +5V or +3.3V

> Eight user LED's: buffered, active high, green

- User option to enable/disable output

> Eight push-button switches: active low

> Four power LED indicators: green

> Integral HCS12/HCS08 BDM pod for programming and debugging

- MC9S12C32 MCU

- 8 MHz oscillator

- Selection jumper for HCS12/HCS08 mode

- Standard 6-pin debug port connection

- Simple RS-232 interface

> Project board can be attached and carried in a standard 3-ring binder

Specifications

Module Size: 8.5" x 11"

Power Input: +9V$_{DC}$ @ 300 mA typical, +6V$_{DC}$ to +16V$_{DC}$ range

CSM12C32 MODULAR BOARD
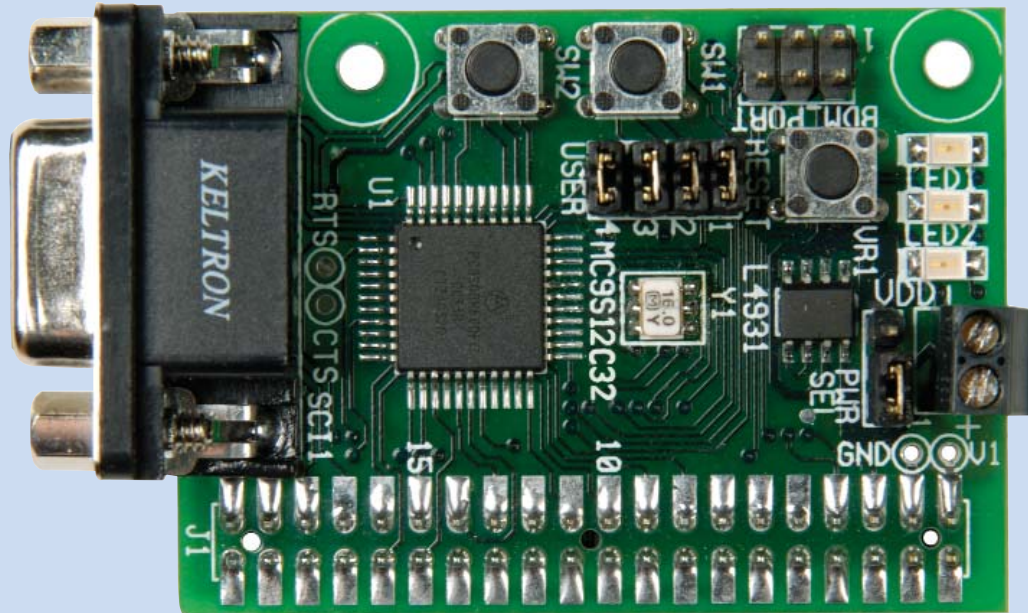
Modular Boards

The HCS08, HCS12 and DSP module boards can be used as stand-alone development platforms or interfaced through the on-board MCU connector on the MCU project board, or any other compatible expansion platform. Because of their small size, the module boards can be outstanding tools for students to program and then plug it into design projects such as robots. To help get you started quickly, we have included the CSM12C32 (HCS12) module in the MCU SLK.

CSM12C32 Module Features
> MC9S12C32 MCU, 48 QFP
  - 32 KB Flash EEPROM
  - 2 KB RAM
  - 32 I/O lines
  - Timer/PWM
  - SCI and SPI communications ports
  - Key wake up port
  - BDM debug port
  - CAN 2.0 module

- Analog to digital converter
- 8 MHz internal bus operation default
- 25 MHz bus operation using internal PLL
- +3.3V_{DC} to +5V_{DC} operation
> 40-pin connector provides access to most MCU I/O signals
> Power input selection jumper
> On-board, regulated +5V power supply
> Optional power input from connector J1
> Optional power output through connector J1
> 16 MHz ceramic resonator
> RS-232 serial port with DB9 connector
> 8-ch., 10-bit, analog to digital converter with full rail-to-rail operation and external trigger capability
> 8-ch., 16-bit timer with input capture, output compare and PWM capabilities
> User components provided
  - Three push button switches: two user, one reset
  - Three LED indicators: 2 user, one VDD

> Jumpers
  - Disable user functions
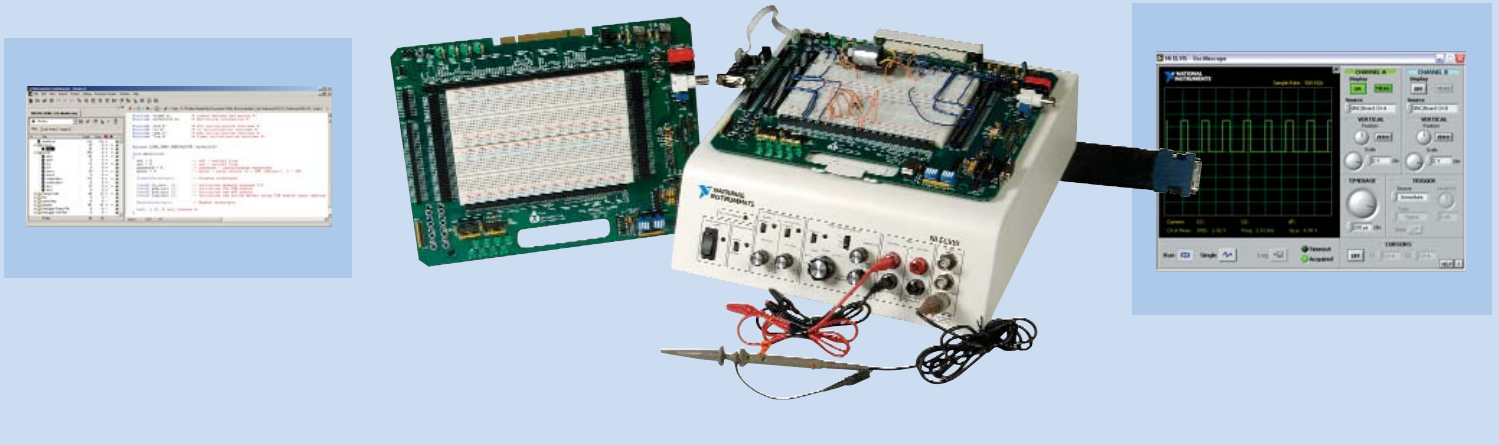 - Power select
> Connectors
  - 40-pin MCU I/O connector
  - 2.0 mm barrel connector power input
  - Debug BDM connector
  - DB9 communications connector

Specifications:
Module Size: 2.2" x 1.6"
Power Input: +9V_{DC} @ 200 mA typical, +6V_{DC} to +16V_{DC} range

NATIONAL INSTRUMENTS EDUCATIONAL LABORATORY VIRTUAL INSTRUMENTATION SUITE

CodeWarrior Development Studio

CodeWarrior Development Studio from Metrowerks is a powerful and user-friendly tool suite designed to increase your software development productivity. It shares a common interface across MCU Families making the environment easy-to-use. With its unrivaled features such as the Processor Expert™ application design tool, a highly optimized compiler, and the project manager with built-in templates, the tool suite's Integrated Development Environment (IDE) allows you to focus on your application software. Additionally, the CodeWarrior environment features an intuitive graphical source-level debugger with integrated profiling capabilities, data visualization, instruction set simulation and much more.

National Instrument's Educational Laboratory Virtual Instrumentation Suite (NI ELVIS)

NI ELVIS is a LabVIEW-based, hands-on design and prototyping environment geared for university engineering and science courses. NI ELVIS consists of LabVIEW virtual instruments, a multifunction data acquisition (DAQ) device, and a custom-designed bench-top workstation. The combination of NI ELVIS with the MCU SLK is ideal for conducting microcontroller instruction because they provide a powerful development and debugging platform through the integrated instrument suite of NI ELVIS.

The NI ELVIS integrated instrument suite provides essential functionality for teaching microcontrollers including

> Manual and programmable power supply for powering the student project board

> Manual and programmable signal generator and digital/analog outputs to provide stimulus to MCU input signals

> Multiple instruments to acquire, visualize and analyze MCU output signals

> LabVIEW integration to provide flexible design, analysis, testing and reporting

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