

Hardware User Guide

Introduction

Thank you for purchasing the J822 Development Kit from Avago Technologies. The J822 Kit is a simple development board, which demonstrates the capabilities of the 24-pin HDJD-J822 color management controller device.

The development kit can be used stand-alone with a programmed system controller on-board, connect to another controller system (using I²C interface) or connect direct to an IBM-PC computer (using parallel port). Sample programs are provided to demonstrate the unique features of the device.

The J822 Development Kit comes with the following:

- J822 Development Board (Figure 1-1)
- Sample Device
- CD-ROM, which contains:
 - J822 Development Kit Hardware User Guide
 - Development Kit Backlight System Design Guide
 - ICM Program User Guide
 - Sample System Controller Program Guide
 - Application Notes
 - Datasheets
 - Sample System Controller Program Codes

If you are missing any part of the kit, please contact your nearest Avago Technologies sales office listed in the back of this publication for help.

J822 DEVELOPMENT BOARD

The J822 development board has the following hardware features:

1. 24-pin SOIC packaged HDJD-J822 device
2. 28-pin DIP packaged PIC18F252 device
3. Onboard +5V switching regulator for direct input from 12V 1000mA AC/DC wall adaptor
4. 25-way parallel port and associated hardware for direct connection to a parallel port interface
5. In-Circuit Serial Programming (ICSP) connector for programming onboard system controller
6. Four push button switches for selecting 4 different set of white color temperature point or as external stimulus
7. Two push button connected to HDJD-J822 brightness and color setting pin
8. 10-way DIP switch for setting various control pins of HDJD-J822 device
9. 6-way DIP switch for individual RGB gain control of the onboard color sensor
10. External I/O connector that port various control pins of HDJD-J822 device externally
11. PWM output connector that connects to external LED driver card
12. External I²C connector for interfacing to external controller board
13. 1K (128 x 8) Serial I²C EEPROM
14. Color RGB sensor connector
15. 3.5 inch lightguide panel with 8 RGB (Red-Green-Blue) Side-firing LED as light source
16. 10 MHz crystal oscillator for PIC18F252 system controller clock operation
17. Onboard RC oscillator for HDJD-J822 color management controller
18. LX1991 LED driver to drive the 8 RGB LEDs
19. Prototype area for user hardware
20. RGB color sensor

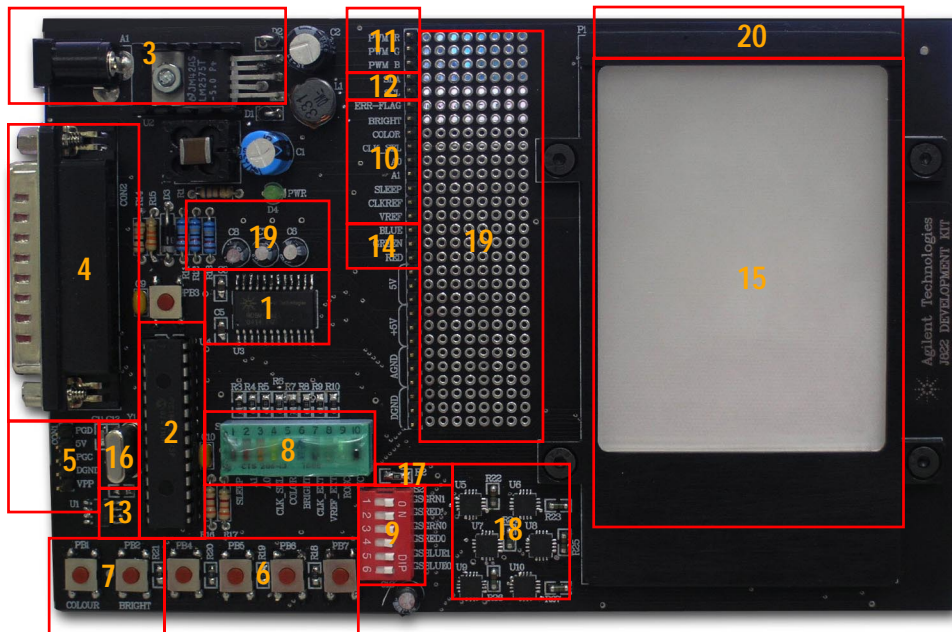


Figure 1. J822 Development Board Hardware

SAMPLE PROGRAMS

The J822 Development Kit includes a CD-ROM with sample demonstration system controller program. This program can be used with the included HDJD-J822 color management controller and PIC18F252 microcontroller. Demo source code and compiled code (one Hex file) are provided.

J822 DEVELOPMENT KIT HARDWARE USER GUIDE

This guide describes the J822 Development Board, including hardware component layout and schematic. Tutorial and demonstration software user guide may be found in the kit programming code example document, which are included in the CD-ROM. Detailed information on HDJD-J822 color management controller and the onboard PIC18F252 system controller can be found in the device's respective data sheet.

Chapter 1 : Introduction - This chapter introduces the J822 Development Kit and provides a brief description of the hardware.

Chapter 2 : Hardware Description – This chapter describes in detail the hardware of the J822 Development Board.

REFERENCE DOCUMENTS

Reference documents listed below are included in the CD-ROM.

- Individual Technical Data Sheets and Reference Manuals:
 - Avago HDJD-J822 color management controller
 - Avago HDJD-S822/S722 RGB color sensor
 - Microchip PIC18Fxx2 system controller
 - STMicroelectronics 1k-bit/8 Serial I²C EEPROM
 - Microsemi LX1991 LED driver
- Application Notes
- Application Brief
- Application Example
- Development Kit Backlight System Design Guide
- ICM Program User Guide
- Development Kit Program Code-Example

Hardware Detail

The J822 Development Kit hardware is extremely simple and is intended to illustrate the ease of use of the Color Management Controller. The development board features the following hardware elements:

COLOR MANAGEMENT CONTROLLER AND SYSTEM CONTROLLER

The board is incorporated with two processors, one is the HDJD-J822 color management controller and the other is the Microchip PIC18F252 system controller.

DISPLAY

Eight Side-Emitting RGB Light Emitting Diodes (LED) are connected to emit colored light to a 3.5 inch lightguide. This lightguide has micro-dot printed on the bottom side which lights up the whole lightguide, causing it to glow in color (depending on what color setting is input to the color management controller).

One green LED is provided to determine whether there is power to the development board (LED on) or not (LED off).

POWER SUPPLY

The development board has a switching regulator that will step-down the 12V input to provide +5V supply needed to power up all the components onboard plus driving the eight LEDs. An external 12V, 1000mA or more unregulated DC supply can be plugged into J1.

Note: The J822 Development Kit does not include a power supply.

PARALLEL PORT

A parallel port interface is provided for easy interfacing with an IBM-PC computer. The port is used to emulate I²C communication using software to perform the communication translation job. Since no special hardware is needed on the parallel port side, hence normal 25-way to 25-way parallel port cable can be used to hook up the board with the computer.

On the IBM-PC computer side, the BIOS -> Onboard Peripheral -> Parallel Port setting must be set to Output-Only or Standard mode, before you can run the demonstration PC software (included in the CD-ROM).

LED DRIVER

LX1991 LED drivers (U5-U10), from Microsemi, are included on the board to illustrate a typical LED driving method. User can choose to use their own LED driver circuit to drive their LEDs through the use PWM output pins on the external input-output connector.

The data sheet of this LX1991 LED driver is included in the CD-ROM for user reference.

SWITCHES

Seven switches provide the following functions:

- PB1 – Active-high switch connected to Pin 9 (COLOR) of HDJD-J822
 - PB2 – Active-high switch connected to Pin 10 (BRIGHT) of HDJD-J822
 - PB3 – MCLR to hard reset the PIC18F252 system controller
 - PB4 – Active-high switch connected to Pin 4 (RA2) of PIC18F252 system controller
 - PB5 – Active-high switch connected to Pin 5 (RA3) of PIC18F252 system controller
 - PB6 – Active-high switch connected to Pin 6 (RA4) of PIC18F252 microcontroller
 - PB7 – Active-high switch connected to Pin 7 (RA5) of PIC18F252 microcontroller
- * By default, 4 different color points will be programmed for PB4-7 for quick demonstration purpose.

When pressed, the switches are pulled high (+5V) (except for PB3, which is grounded). When idle, they are grounded (except for PB3, which is pulled high +5V).

SENSOR INPUT

For J822 Development Board, it supports RGB color sensor input. A 3-pin header is provided for this purpose. Besides that, the development board also included a RGB color sensor module, located on top of the display panel, for feedback color management demonstration. HDJD-S822 color sensor is used on the development board.

The S2 DIP switch is used to set the gain of the individual R,G and B channel of the color sensor used on the development board. Each channel gain is selectable through a 2-bit gain selector.

- S2-1 – Green Gain-1
- S2-2 – Red Gain-1
- S2-3 – Green Gain-0
- S2-4 – Red Gain-0
- S2-5 – Blue Gain-1
- S2-6 – Blue Gain-0

For user information, this S2 gain switch is sensor dependent. Different sensor has different gain setup. The data sheet for this sensor is included in the CD-ROM for your reference.

SERIAL EEPROM

A M24C01 1K (128 x 8) serial EEPROM, from STMicroelectronics, is included on the board to illustrate I²C bus concepts and to store HDJD-J822 calibration data.

IN-CIRCUIT SERIAL PROGRAMMING (ICSP) CONNECTOR

By way of the header connector (CON1), the PIC18F252 system controller can be connected for onboard reprogramming. The ICSP connector utilizes RB6 and RB7 of the system controller for in-circuit serial programming. This connector is compatible with Microchip Promate 2 programmer, which support ICSP interface.

ADC INPUT LOW-PASS FILTER

Since the LEDs are controlled by pulse width modulation output from the HDJD-J822, the sensor output will also be pulse width modulated. Each sensor channel needs to be averaged by passing the sensor output voltage through a low pass filter. On the board, this low pass filter is realized through a RC low-pass filter (R11/C5, R12/C7 and R13/C8).

Further explanation on the resistor and capacitor selection is documented in the application note, which is included in the CD-ROM.

OSCILLATOR OPTIONS

There are two oscillator onboard the development kit. One is for the HDJD-J822 color management controller and the other is for the PIC18F252 system controller. For HDJD-J822, an RC oscillator (2.5 MHz approximately) is supplied. The operating frequency of HDJD-J822 can be changed by changing the ROsc resistor value (R2).

For PIC18F252 system controller, a crystal oscillator (10 MHz) is supplied. If user would like to operate the onboard system controller at different frequency, this crystal oscillator (Y1) can be changed to other value.

EXTERNAL INPUT-OUTPUT CONNECTOR

Most of the HDJD-J822 color management controller and HDJD-S722 color sensor pins are mappable on the external input-output connector. These pins include:

- | | |
|----------------------------------|------------------|
| • PWM output R/G/B | (PWM R/G/B) |
| • I ² C SDA | (SDA) |
| • I ² C SCL | (SCL) |
| • Error flag | (ERR-FLAG) |
| • Bright control | (BRIGHT) |
| • Color control | (COLOR) |
| • Clock selector | (CLK_SEL) |
| • I ² C address A0 | (A0) |
| • I ² C address A1 | (A1) |
| • Sleep trigger | (SLEEP) |
| • Clock reference | (CLKREF) |
| • External ADC voltage reference | (VREF) |
| • Color sensor input R/G/B | (BLUE/GREEN/RED) |
| • 5V/+5V supply pin | (5V/+5V) |
| • AGND/DGND ground pin | (AGND/DGND) |

The following figures show the parts layout (silkscreen) and schematics for the J822 Development board.



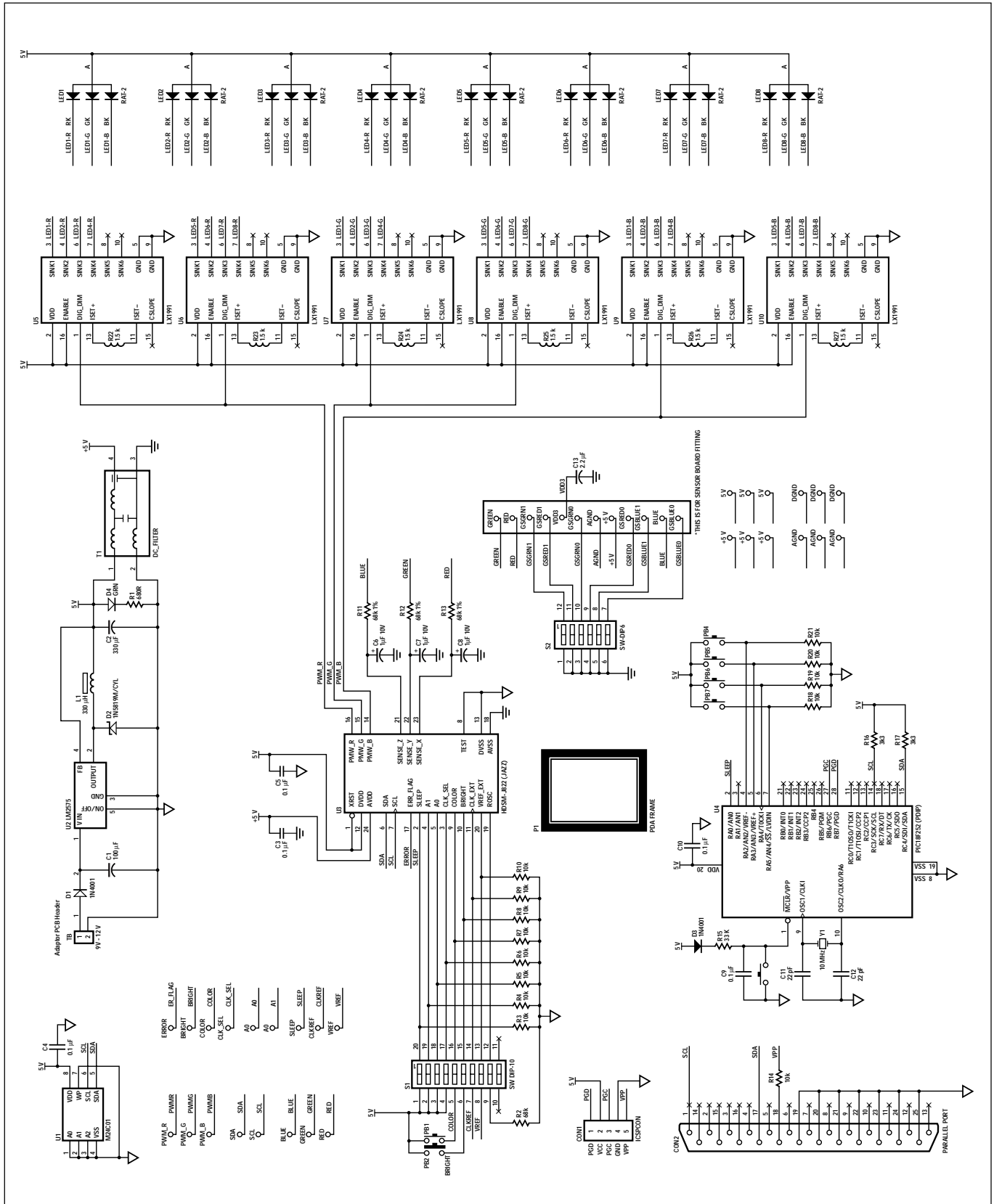


Figure 3. J822 Development Board Schematic

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5989-1598EN July 8, 2006

