
USER GUIDE

**LightViewä 311k Digital Display Module
Evaluation Kit**

Model LDM-0311-EK1

Revision B

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Introduction

This User Guide provides a description of the operation of the Displaytech LightView™ 311k Digital Display Module Evaluation Kit, Model LDM-0311-EK1 for general LV311k display evaluation. The document is divided into four primary sections: kit operational overview, block diagrams, basic use models, and electrical specifications. This document helps one use the LV311k evaluation kit and includes supplemental datasheets, customer product specifications and application notes as supplemental information to the kit, which are included with the kit material in a CD-ROM.

Overview

The LDM-0311-EK1 kit allows for basic evaluation of the LV311k microdisplay. The basic kit includes a single driver board, LV311k display with an optical engine attached via a flex, and a power supply. The driver board accepts NTSC or PAL video in standard composite or S-video connections. The LV311k supports three 8-bit digital video formats: RGB serial, CCIR-601, and CCIR-656, however in this kit implementation only CCIR-601 is utilized. Video inputs can be at either 50Hz or 60Hz vertical frequency. For the CCIR video formats, the video image can be displayed with or without overscan. Also included on the driver board is a serial interface (RS-232) connection that allows users to access a limited register set and gamma correction within the LV311k display for evaluation of different modes and operations of the display.

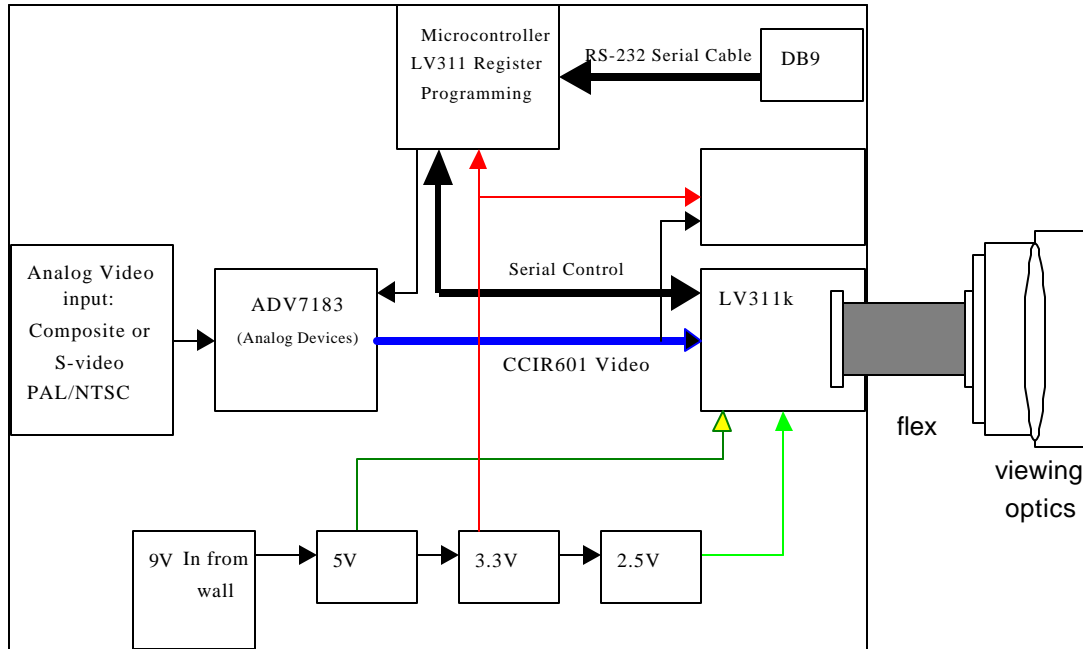
The Displaytech LightView™ 311k Digital Display Module is a high resolution, low power offering primarily designed for color digital still camera and video camcorder electronic viewfinders. The module provides an integrated display solution, incorporating the display panel, illumination, polarization optics, and control circuitry in a compact opto-mechanical package. This product takes advantage of the fast switching speeds and superior optical qualities of Displaytech's patented Ferroelectric Liquid Crystal (FLC) materials, delivering high quality images free of motion smearing. Each pixel is capable of showing 24 bits of color, obtained through color sequential mode of operation. This display module delivers high brightness while consuming low power at 120 Hz frame rates. The display also includes a sleep mode that dramatically reduces power consumption. Industry standard digital interfaces are supported to provide an easily integrated, high performance solution for camcorder and digital still camera customers, as well as for other high-tech display applications.

For best understanding of operation of the LV311k display we suggest that you read the included Customer Product Specification (CPS). This document will provide you with much more detail on video signals and timing, serial configuration control, registers, as well as standard mechanical, optical and electrical specification.

Kit Components:

1. One driver board
2. One 9V power supply
3. One Serial Cable
4. Two 25-pin flexes (3 inch and 6 inch)
5. One LDE-0311-RD1 view optics (reference optical engine with included LV311k display)
6. One LV311k mechanical sample
7. One CD containing datasheets, kit user guide, and an Excel Spreadsheet Gamma calculator.

LDM-0311-EK1 Block Diagram



Operational Description

The basic operation of this kit is centralized in the Analog Devices IC (ADV7183) which accepts in the standard analog video inputs and then converts into digital CCIR601 format which is directly compatible with the LV311 interface. The driver board provides S-Video and Composite video input jacks for ease of use.

Changing of registers in the LV311k is accomplished via a microcontroller that directly reads and writes via the LV311k 4-wire serial interface. Access is provided through a standard RS-232 serial interface common to PC platforms.

The connection to the LV311k is via a 25-pin LIF connector. Displaytech supplies both 3 inch and 6 inch flexes for connection between the driver and the display.

**** 9V, 1.1A switching supply provided, regulation is done on the board for 5V, 3.3V and 2.5V.**

Using the LDM-0311-EK1 kit

Start up and shut down procedures

The start up and shut down operations of the EK1 is meant to be simple. To view video images, a series of simple steps are recommended.

Start Up:

1. Ensure the flex connections to the driver board and the LV311k module are inserted solidly and evenly. The direction of the connection side should match Pin 1 to Pin 1. (Display should be viewable when laying flat while plugged in)
2. Ensure you have a valid video supply via either the standard Composite or S-Video inputs.
3. Plug in power to the board. (Display will go into 'Sleep' mode.), 3 green LED's will illuminate.
4. Plug in running video supply, you should now see video image.

Shut Down:

1. Remove video supply (Display will go into a controlled 'Sleep' mode)
2. Remove power

Supply of Video

The EK1 expects standard analog video in PAL or NTSC format provided via either Composite or S-Video input connections. When switching between the video connections, it will require cycling of power to the board by physically unplugging and plugging of the power supply. When switching between PAL and NTSC, the EK1 will auto-detect if it is PAL or NTSC format and set the appropriate bit in the Control Register of the LV311k. The EK1 is initially provided with NTSC pre-set displays that are PAL capable, and can be manually set via the serial interface writing the LV311k control register for PAL/NTSC (See the LDM-0311-CPS for additional details).

Attaching and detaching the LV311k display and flex

The Molex 0.5mm pitch connectors on both the board and the display are double sided, so one just need ensure that the orientation of Pin 1 on the board side matches Pin 1 on the display. A simple rule of thumb is if you can look in the viewing optics while it is sitting flat, and you have the orientation of the driver board with the component side up, you can plug in the flex safely. Flexes provided with the kits have labels attached for easy reference.

Both connectors are called "LIF", or Low Insertion Force. Grasp the flex by the dark 'stiffener' on either end and firmly press into the connector. Once inserted, ensure that the exposed metal traces on the flex are evenly exposed, which will make sure there is no overlap or shorting of signals. To remove, just firmly pull straight out from the connectors.

Note: it is best not to pinch or excessively bend the flexes. Even though they do 'flex', if excessively the traces can crack or open causing problems in operating the display.

Using the Serial Port connections

There is a standard RS-232 connector on the driver board that mates with one end of the serial cable provided with the kit. The other end mates with a serial port on a PC. When connecting the cable, make note of the serial port connection to on the PC, as many times there is an "A" and a "B". Once your connections are made, simply cycle power in the driver board and you should see a command line prompt appear within the HyperTerminal window and a note of "Lightview 311k Eval Kit".

The HyperTerminal Window is used for standard character entry via a prompt on a command line. When you set up the connections with your HyperTerminal Window, part of the configuration is to set which serial port you are using. Also, the baud rate for the connection is recommended at 115k, generally found under the Properties menu during setup. If you don't have a HyperTerminal window access, generally you can search for it in your PC with the "Find File" utility, where you will generally find a file such as *hyperterm.ht* or *hyperterminal.exe* to launch the window.

***Note: When setting up the HyperTerminal window, it is best to add some line delay when doing gamma table writing from the Excel spreadsheet: Inside the Window: File→Properties→Settings→ASCII Setup; enter 15mS for both Character and Line Delay.*

There is a limited functionality for the use of this feature, primarily to write the configuration of video and gamma, for details consult the register section of the included Customer Product Specification document.

- Video Configuration Registers 0 (index *01h*) ; Video Mode, Sleep Mode, Flip
- Video Configuration Registers 1 (index *02h*) ; Sync polarity and blanking
- Video Configuration Register 2 (index *03h*) ; CCIR656 Additional Blanking
- Gamma correction values (index *04h-13h*) ; Gamma correction (see *LV311_Gamma.xls*)
- Brightness rightness control register at (index *14h*) ; Brightness ratio settings
- Identification Register (index *15h*) ; Read product identifier and revision

You are provided an Excel spreadsheet on the CD-ROM (*LV311_Gamma.xls*) that has a simple calculator for gamma correction. In that sheet is a series of 16 commands (*WS0440* through *WS1340*), you can physically cut and paste these 16 lines from Excel into the HyperTerminal command line, which then writes the gamma registers in the LV311 for immediate viewing feedback.

To write or read to a register it is via the *WSXXYY* or *RSXX* command. When writing, *XX* refers to the register, and *YY* refers to the data. When reading, *XX* refers to the register to be read, it is important to always use CAPITAL letters in the Hyperterminal window

For example, to wake up the display from sleep mode, the command would be, given CCIR601, NTSC, no H or V flip, and no overscan:

➤ *WS01A2*

Default while running

➤ *WS01AC*

Default to turn off (sleep mode)

➤ *WS01AE*

The gamma registers are *04h* through *13h* as noted in the cut and paste section in the Excel calculator.

Please consult the LDM-0311-CPS for details on those registers and calculation of gamma, as well as the configuration and brightness settings. There are other proprietary registers in the LV311 that relate to a standard product function and manufacturing, please consult Displaytech with your application requirements prior to expecting other register functionality.

Description of the Viewing Optics

There is a set of viewing optics with a 15X magnification lens that also has a simple rotating diopter adjust provided with the EK1 kit. The supplied set is noted as an "engine", and can be supplied separately as a reference design noted as LDE-0311-RD1. There are other reference design engines or drawings available from Displaytech to suit different sizes and shapes or applications. Displaytech can assist with your opto-mechanical designs, or you can consult with Displaytech for provision of a whole engine.

Specifications

Power: Power Supply: 9V DC 1.1 Amp

Control: RS-232C operating at 115200 BPS, no parity, 8 data bits, 1 stop bit

Video In: NTSC Composite, PAL Composite, NTSC S-Video, or PAL S-Video
VGA (640 x 480) at 60 Hz frame rate.

Corporate Profile

Longmont, Colo.-based Displaytech Inc. makes and sells microdisplays with superior image quality to performance-driven consumer electronics companies, providing sustainable competitive advantages to their digital still cameras, camcorders, and mobile communication devices. Displaytech offers high-quality, patented, ferroelectric liquid crystal (FLC) display products through its LightView™ product lines, which use less power and have smaller form factors, allowing for product design innovation and meeting tough manufacturing demands. Established partnerships with industry-leading manufacturers also position Displaytech to keep pace with the challenges of the high-volume consumer electronics market. For more information visit www.displaytech.com.

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