TEXAS INSTRUMENTS

AN-1300 LP3943 Evaluation Kit

1 LP3943 Overview

The LP3943 is an integrated device capable of independently driving 16 LEDs. This device also contains an internal oscillator that provides all the necessary timing required for driving LED. Two prescaler registers along with two PWM registers provide a versatile duty cycle control. The LP3943 contains the ability to dim/blink LEDs in SMBUS/I²C applications. For more information, please refer to *LP3943 RGB/White/Blue 16-LED Fun Light Driver* (SNVS256).

2 Evaluation Kit Overview

LP3943 Evaluation Kit contains the evaluation board and PC software, and supports complete functional evaluation of the LP3943. All functions of the chip can be programmed via the use of the I²C interface port. The PC software provided emulates the I²C bus communication protocol. Hand shaking logic to interface to PC's parallel port and all necessary level shifting is provided.

3 Getting Started

The following instructions show how to use the LP3943 evaluation kit in default conditions. Please use the ESD protection (ground cable) to prevent any unwanted damaging ESD events.

Install the evaluation software on a PC by copying the "LP3943.exe" from the CD to the LP3943 folder in your computer. There are two ways to launch the software: without the evaluation board or with the evaluation board connected to the cable.

Launching the software without the evaluation board:

1. Start the software by double-clicking on its icon. A message will appear stating that the LP3943 board is not detected, and will ask if the user wants to switch to virtual LED mode. Click "Yes."

2. The default conditions of the virtual LEDs are different than that of the LP3943. Please be aware that the virtual LEDs simulate the functionality of the LP3943, but they do not perform exactly to the specification. To truly evaluate the LP3943, please request an LP3943 evaluation board.

Launching the software with the evaluation board connected to the LPT cable:

1. Connect a power supply (typically 5V) to "VDD" and "GND" pins. Power supply's negative terminal should be connected to "GND" and positive to "VDD". This will provide power to the LP3943 and the LEDs. Jumper JP1 should be in the "VDD" position. For added flexibility, a separate power supply can be connected to "VEXT" to supply power to LEDs, with jumper JP1 in the "VEXT" position.

2. The evaluation board is now ready for operation. Turn on the power supply.

3. Connect the LPT cable to the evaluation board and the LPT port of your PC.

4. Start the software by double-clicking on its icon.

5. The evaluation kit is now ready to use and the LP3943 can be programmed and controlled through the PC software.
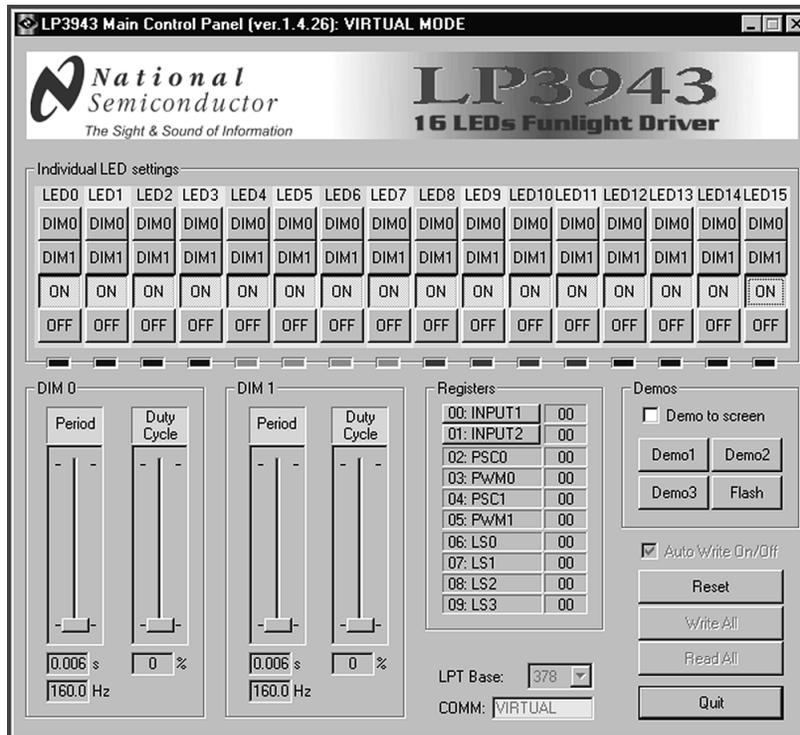
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Figure 1. LP3943 Software in Virtual LED Mode with All LEDs Turned On (this is not the default state)
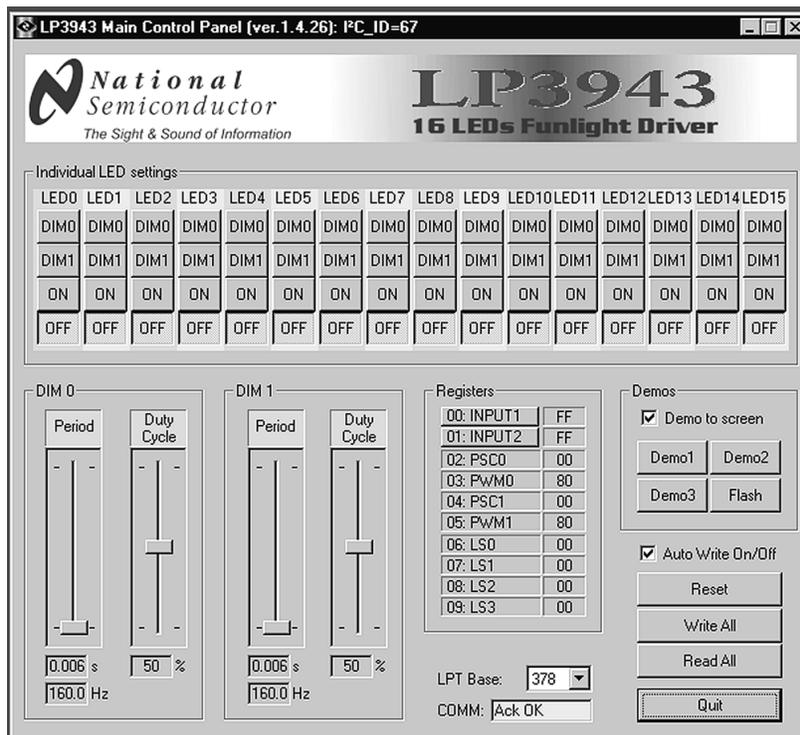

Figure 2. LP3943 Software Launched with Evaluation Board Connected to LPT Cable (in default state)

4   Control Panel

Individual LED settings – allows the user to program LED0 to LED15 by turning it on or off, or dimming/blinking at a specified rate. DIM0 corresponds to the values programmed in PWM0 and PSC0 registers. DIM1 corresponds to the values programmed in PWM1 and PSC1 registers. The default state is off for all LEDs.

DIM0 – The sliding bars control the PSC0 and PWM0 registers. The PSC0 register is used to program the period of DIM0 (6.25msec to 1.6sec). The PWM0 register is used to program the duty cycle of DIM0 (0% to 100%). The default values are 6.25msec and 50% duty cycle.

DIM1 – The sliding bars control the PSC1 and PWM1 registers. The PSC1 register is used to program the period of DIM1 (6.25msec to 1.6sec). The PWM1 register is used to program the duty cycle of DIM1 (0% to 100%). The default values are 6.25msec and 50% duty cycle.

Registers – This display shows the current status of the ten registers (in hex) in the LP3943. Registers 00 and 01 are read-only registers that can be updated by clicking on the buttons. The other registers can be updated by clicking on "Read All."

COMM – Message indicating proper/improper I2C communication. Upon successful communication, "Ack OK" with green background will be displayed. Otherwise, "NoAck" with red background will be displayed. Errors include absence of power supply to the evaluation board, absence of LPT cable connection, and wrong LPT port address.

LPT Base – Three options for LPT port setting. Default value is 378.

Demos to screen – By selecting this option, the individual LED settings panel will become active to reflect the states of LEDs in demos.

Demo1 – Music demo. The LEDs are controlled by the amplitude of the music.

Demo2 – Music demo. The LEDs will light up in circle as music progresses.

Demo3 – Non-music demo to illustrate dimming effect of LEDs.

Flash – The RGB LED will all turn on to create a flashlight effect.

Auto Write On/Off – When auto write feature is on (the box is checked), any change will take place immediately. If auto write is off (the box is not checked), changes will take place only after pressing "Write All." Any LED that is programmed while auto write is off will only take place if "Write All" button is pressed before auto write is on; otherwise, these LEDs will go back to their previous states.

Reset – resets the LP3943 in its default state and erases all previously programmed value on the control panel to reflect the LP3943 default state.

Write All – All programmed values on the control panel will be executed when this button is pressed.

Read All – All ten registers will be read from the chip to refresh the control panel when this button is pressed.

Quit – Quits the program.

5 Bill of Material for LP3943

Designator	Description	Footprint	Comment
C1, C2, C3, C5, C7, C8, C9	0.1 µF, ceramic	0805	TDK C2012X7R1H104K
C4, C6	2.2 µF, ceramic	0805	
R0 – R15, except R7, R8	82ohm	0603	
R7	120ohm	0603	
R8	140ohm	0603	
RSCL, RSDA	2.2k	0603	
RA0, RA1, RA2	100k	0603	
K1	DB25T	DB25T	SPC Tech
D1, D2	SCHOTTKY Rectifier	0805	On Semi MBRM120
JP1	HEADER 2 × 2		SPC Tech
LED0 - LED15, except 7,8,9	blue	0805	Vishay or Osram
LED7,8,9	RGB		Sharp
U2	Level Shifter	0.15" SOIC16	On Semi MC14504B
U3	Level Shifter	0.15" SOIC16	On Semi MC14504B
U4	3 state quad buffers	0.15" SOIC14	Fairchild MM74HC125M
U1	LED driver	NHW0024A	Texas Instruments LP3943

The brightness of LED is controlled by how much current goes through it. On the LP3943 evaluation board, resistors R0 to R15 set the current going through LED0 to LED15, respectively. Except for R7, R8 and R9, the rest of the resistors are 82ohm to program 15mA through each LED. R7=120ohm to provide 15mA for blue LED, R8=140ohm to provide 20mA for red LED, and R9=82ohm to program 15mA for green LED. These resistors are chosen to provide full-scale intensity when the LED is at 100% of the duty cycle.

6   Board Schematic
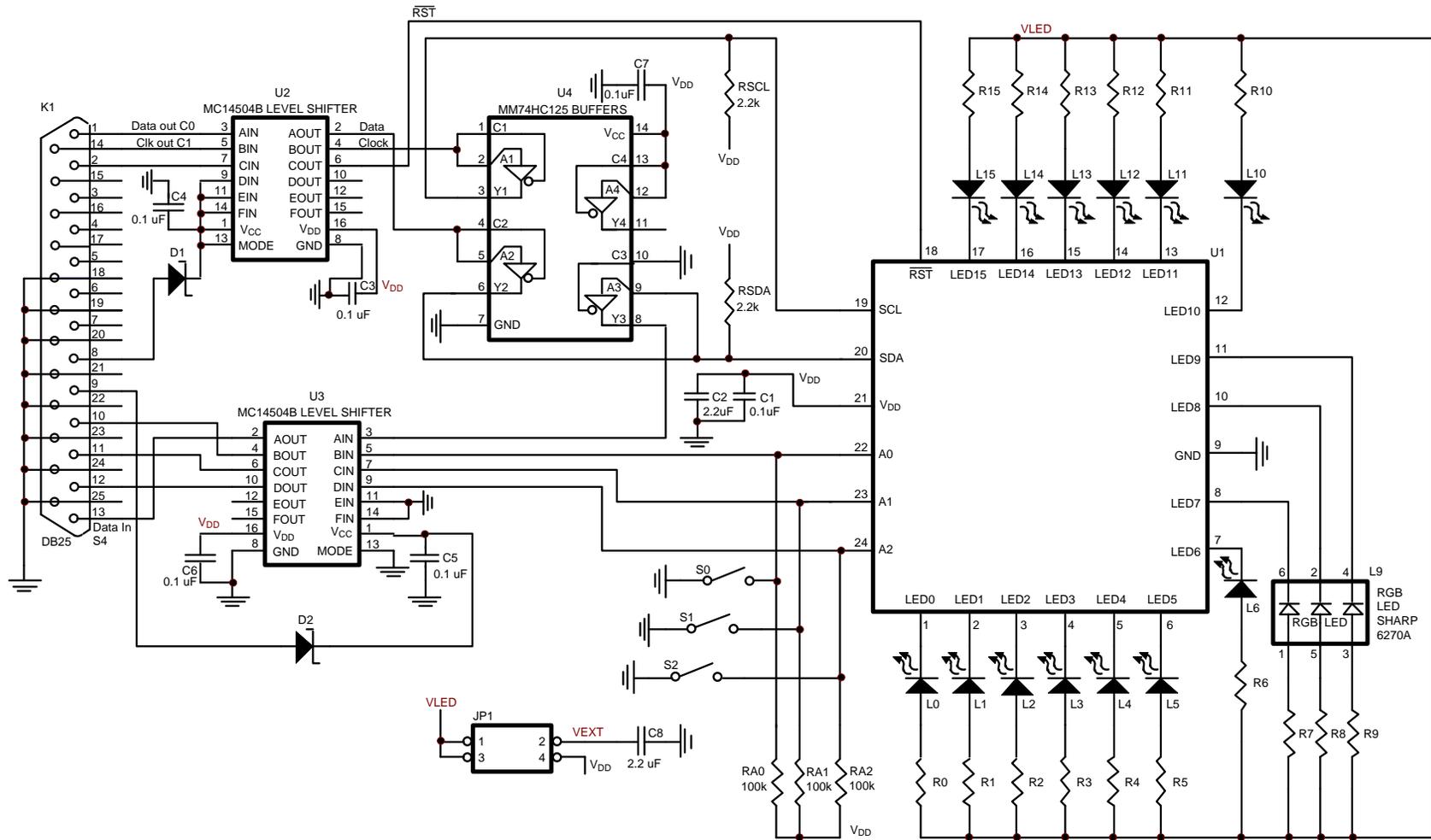
Figure 3. LP3943 Board Schematic

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