

AN-1344 LP3944 Evaluation Kit

1 LP3944 Overview

The LP3944 is an integrated device capable of independently driving eight 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 LP3944 contains the ability to dim/blink LEDs in SMBUS/I²C applications. For more information, please refer to the LP3944 datasheet.

2 Evaluation Kit Overview

LP3944 Evaluation Kit contains the evaluation board and PC software and supports complete functional evaluation of the LP3944. 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 LP3944 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 "LP3944.exe" from the CD to the LP3944 folder in your computer. There are two ways to launch the software. One way is without the evaluation board. Another way is 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 LP3944 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 LP3944. Please be aware that the virtual LEDs simulate the functionality of the LP3944, but they do not perform exactly to the specification. To truly evaluate the LP3944, please request for a LP3944 evaluation board.

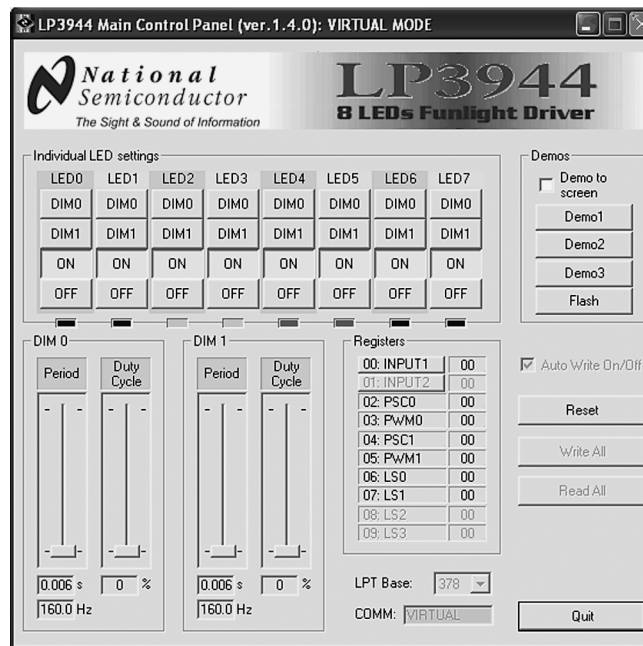


Figure 1. LP3944 software in virtual LED mode with all LEDs turned on (this is no the default state)

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

1. Connect a power supply (typically 5V) to "V_{DD}" and "GND" pins. Power supply's negative terminal should be connected to "GND" and positive to "V_{DD}". This will provide power to the LP3944 and the LEDs. Jumper JP1 should be in the "V_{DD}" 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 LP3944 can be programmed and controlled through the PC software.

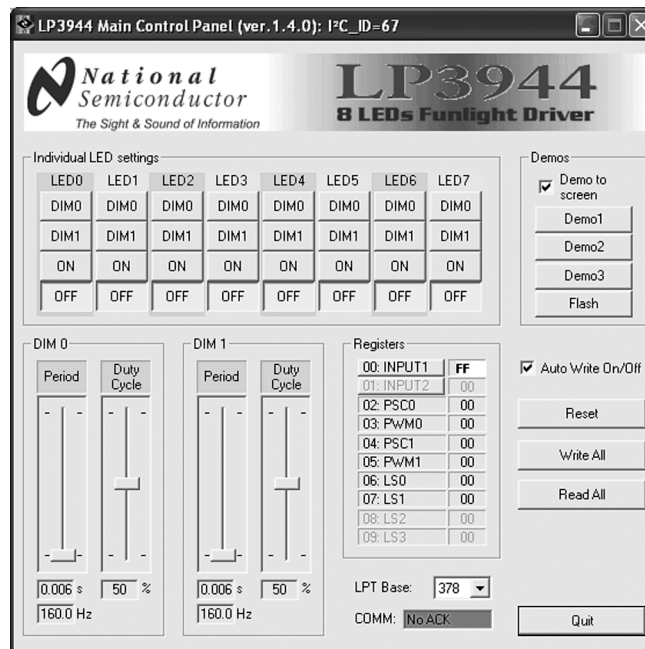


Figure 2. LP3944 software launched with evaluation board connected to LPT cable (in default state).

4 The Control Panel

Individual LED settings—allows the user to program LED0 to LED7 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 (6.25 ms to 1.6s). The PWM0 register is used to program the duty cycle of DIM0 (0% to 100%). The default values are 6.25 ms 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 (6.25 ms to 1.6s). The PWM1 register is used to program the duty cycle of DIM1 (0% to 100%). The default values are 6.25 ms and 50% duty cycle.

Registers—This display shows the current status of the ten registers (in hex) in the LP3944. 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. Soundcard needed to activate the button to play. The LEDs are controlled by the amplitude of the music.

Demo2—Music demo. Soundcard needed to activate the buttons to play. 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 LP3944 in its default state and erases all previously programmed value on the control panel to reflect the LP3944 default state.

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

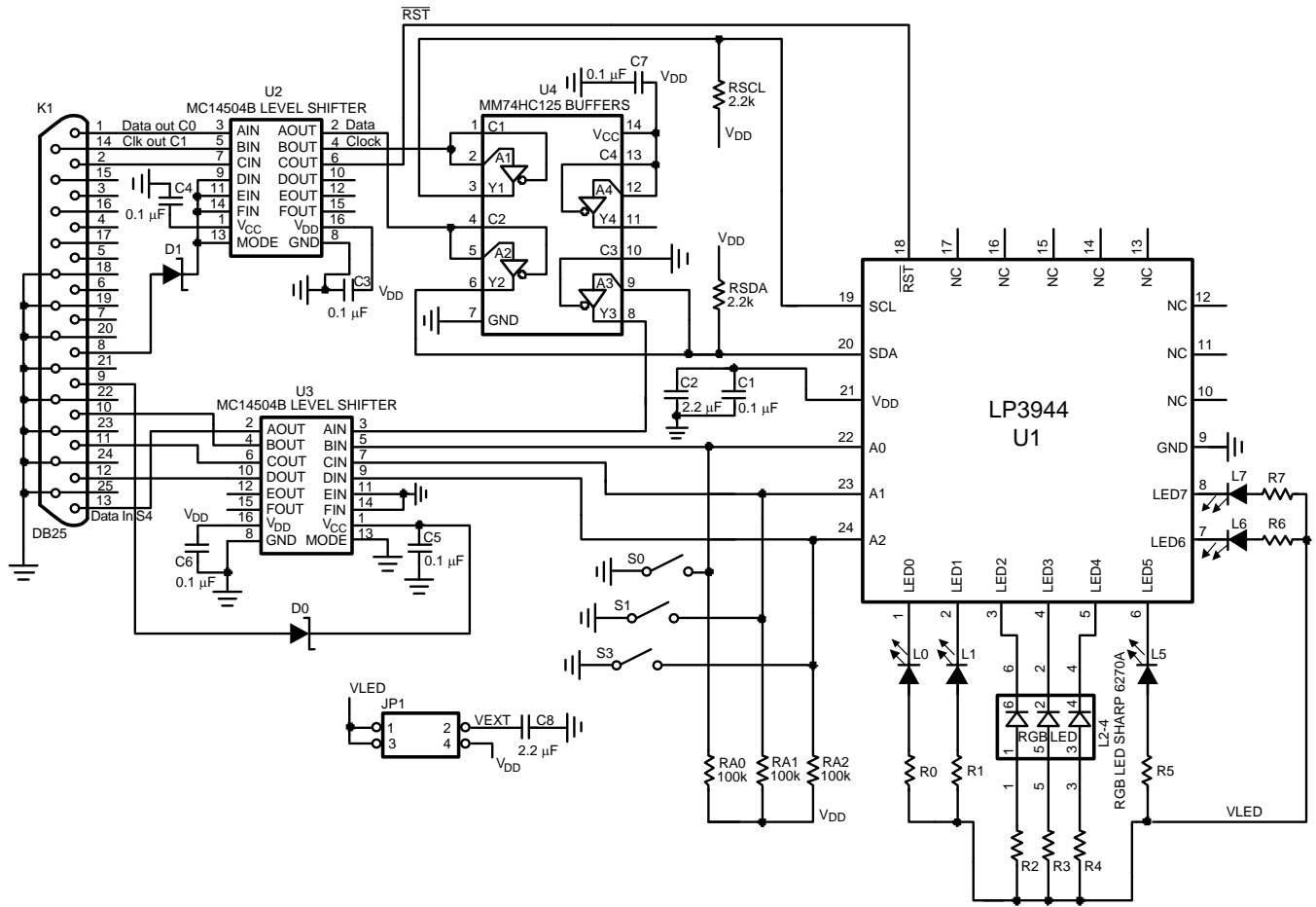
Read All—All ten registers will be read from the chip to refresh the control panel when this button is pressed.

Quit—Quits the program.

5 Bill Of Material for LP3944

Designator	Description	Footprint	Comment
C1, C3, C4, C5, C6, C7	0.1 μ F, ceramic	0805	TDK
C2, C8	2.2 μ F	0805	TDK
R0, R1, R4, R6, R7	82 Ω	0603	
R2	121 Ω	0603	
R3	140 Ω	0603	
RSCL, RSDA	2.2k	0603	
RA0, RA1, RA2	100k	0603	
K1	DB25T		
D1, D2	SCHOTTKY Rectifier	805 2x	On Semi MBRM120
JP1	HEADER 2X2		
LED0 - LED15	green, red, blue or white	0805 2x	Vishay or Osram
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	RTW0024	TI LP3944

6 LP3944 Evaluation Board Schematic



IMPORTANT NOTICE

Texas Instruments Incorporated and its subsidiaries (TI) reserve the right to make corrections, enhancements, improvements and other changes to its semiconductor products and services per JESD46, latest issue, and to discontinue any product or service per JESD48, latest issue. Buyers should obtain the latest relevant information before placing orders and should verify that such information is current and complete. All semiconductor products (also referred to herein as "components") are sold subject to TI's terms and conditions of sale supplied at the time of order acknowledgment.

TI warrants performance of its components to the specifications applicable at the time of sale, in accordance with the warranty in TI's terms and conditions of sale of semiconductor products. Testing and other quality control techniques are used to the extent TI deems necessary to support this warranty. Except where mandated by applicable law, testing of all parameters of each component is not necessarily performed.

TI assumes no liability for applications assistance or the design of Buyers' products. Buyers are responsible for their products and applications using TI components. To minimize the risks associated with Buyers' products and applications, Buyers should provide adequate design and operating safeguards.

TI does not warrant or represent that any license, either express or implied, is granted under any patent right, copyright, mask work right, or other intellectual property right relating to any combination, machine, or process in which TI components or services are used. Information published by TI regarding third-party products or services does not constitute a license to use such products or services or a warranty or endorsement thereof. Use of such information may require a license from a third party under the patents or other intellectual property of the third party, or a license from TI under the patents or other intellectual property of TI.

Reproduction of significant portions of TI information in TI data books or data sheets is permissible only if reproduction is without alteration and is accompanied by all associated warranties, conditions, limitations, and notices. TI is not responsible or liable for such altered documentation. Information of third parties may be subject to additional restrictions.

Resale of TI components or services with statements different from or beyond the parameters stated by TI for that component or service voids all express and any implied warranties for the associated TI component or service and is an unfair and deceptive business practice. TI is not responsible or liable for any such statements.

Buyer acknowledges and agrees that it is solely responsible for compliance with all legal, regulatory and safety-related requirements concerning its products, and any use of TI components in its applications, notwithstanding any applications-related information or support that may be provided by TI. Buyer represents and agrees that it has all the necessary expertise to create and implement safeguards which anticipate dangerous consequences of failures, monitor failures and their consequences, lessen the likelihood of failures that might cause harm and take appropriate remedial actions. Buyer will fully indemnify TI and its representatives against any damages arising out of the use of any TI components in safety-critical applications.

In some cases, TI components may be promoted specifically to facilitate safety-related applications. With such components, TI's goal is to help enable customers to design and create their own end-product solutions that meet applicable functional safety standards and requirements. Nonetheless, such components are subject to these terms.

No TI components are authorized for use in FDA Class III (or similar life-critical medical equipment) unless authorized officers of the parties have executed a special agreement specifically governing such use.

Only those TI components which TI has specifically designated as military grade or "enhanced plastic" are designed and intended for use in military/aerospace applications or environments. Buyer acknowledges and agrees that any military or aerospace use of TI components which have **not** been so designated is solely at the Buyer's risk, and that Buyer is solely responsible for compliance with all legal and regulatory requirements in connection with such use.

TI has specifically designated certain components as meeting ISO/TS16949 requirements, mainly for automotive use. In any case of use of non-designated products, TI will not be responsible for any failure to meet ISO/TS16949.

Products

Audio	www.ti.com/audio
Amplifiers	amplifier.ti.com
Data Converters	dataconverter.ti.com
DLP® Products	www.dlp.com
DSP	dsp.ti.com
Clocks and Timers	www.ti.com/clocks
Interface	interface.ti.com
Logic	logic.ti.com
Power Mgmt	power.ti.com
Microcontrollers	microcontroller.ti.com
RFID	www.ti-rfid.com
OMAP Applications Processors	www.ti.com/omap
Wireless Connectivity	www.ti.com/wirelessconnectivity

Applications

Automotive and Transportation	www.ti.com/automotive
Communications and Telecom	www.ti.com/communications
Computers and Peripherals	www.ti.com/computers
Consumer Electronics	www.ti.com/consumer-apps
Energy and Lighting	www.ti.com/energy
Industrial	www.ti.com/industrial
Medical	www.ti.com/medical
Security	www.ti.com/security
Space, Avionics and Defense	www.ti.com/space-avionics-defense
Video and Imaging	www.ti.com/video

TI E2E Community

e2e.ti.com