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# UM10537

PCA9634 demonstration board OM13327

Rev. 1 — 7 March 2012

User manual

## Document information

Info	Content
<b>Keywords</b>	I2C, PCA9634, RGB, RGBA, 8 x 8-bit PWM
<b>Abstract</b>	The OM13327 is an add-on to the NXP I2C 2005-1 demo board. This daughter board makes it easy to test and design with the PCA9634, an 8-bit Fast-mode Plus (Fm+) low power LED driver. These boards, along with the I2CUSB Lite GUI (PC-based), provide an easy to use evaluation platform.



**Revision history**

<b>Rev</b>	<b>Date</b>	<b>Description</b>
v.1	20120307	user manual; initial release

**Contact information**

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## 1. Introduction

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The PCA9634 evaluation board features LEDs for color mixing, blinking and dimming demonstrations. A graphical interface allows the user to easily explore the different functions of the driver. The board can be connected in series with other I<sup>2</sup>C-bus demo boards to create an evaluation system.

The IC communicates to the host via the industry standard I<sup>2</sup>C-bus/SMBus port. The evaluation software runs under Microsoft Windows PC platform.

## 2. Features

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- A complete evaluation platform for the PCA9634 8-bit low power LED driver
- Easy to use GUI based software demonstrates the capabilities of the PCA9634
- On-board RGBA LEDs for visual experience
- Convenient test points for easy scope measurements and signal access
- USB interface to the host PC
- No external power supply required

## 3. Getting started

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### 3.1 Assumptions

Familiarity with the I<sup>2</sup>C-bus is helpful but not required.

### 3.2 Static handling requirements

#### CAUTION



This device is sensitive to ElectroStatic Discharge (ESD). Therefore care should be taken during transport and handling. You must use a ground strap or touch the PC case or other grounded source before unpacking or handling the hardware.

### 3.3 Minimum system requirements

- PC Pentium 60 processor (or equivalent), 8 MB RAM, 10 MB of hard drive space
- One USB port (either 2.0 or 1.1 compatible)
- Windows 98SE, ME, 2000, XP, or Vista
- I2C 2005-1 demonstration board (OM6275)

### 3.4 Power requirements

The NXP demonstration board I2C 2005-1 and OM13327 hardware obtain power from the PC USB port. Care should be taken not to exceed the USB port current capabilities.

## 4. Installation

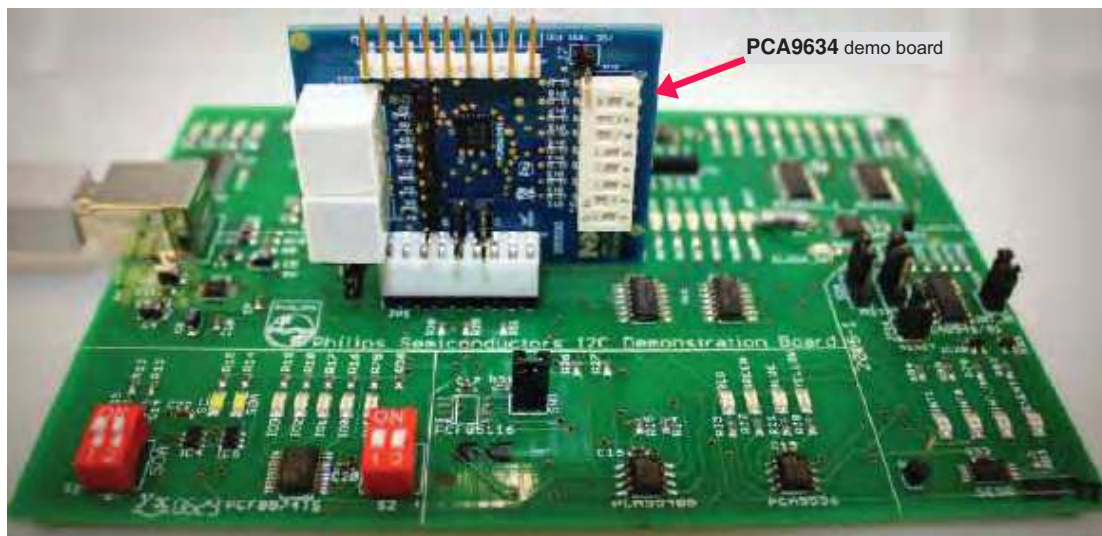
### 4.1 I2C 2005-1 board and WIN-I2CUSB Lite software

The OM13327 is a daughter card to the OM6275 I2C 2005-1 demo board. You may download the WIN-I2CUSB Lite software, the OM6275 user manual UM10206, and find ordering information at the NXP web site [ics.nxp.com/support/boards/i2c20051/](http://ics.nxp.com/support/boards/i2c20051/).

### 4.2 OM13327 connection to I2C 2005-1 board

The I2C 2005-1 demo board should be disconnected from your PC before mounting the OM13327 board on to it. The OM13327 board has a 9-pin female connector that connects to the JP1 male connector on the I2C 2005-1 board.

With both boards facing you, connect the OM13327 board to the I2C 2005-1 board before connecting the USB cable. Once the board is connected, connect the USB cable and start the WIN-I2CUSB Lite software. You are now ready to evaluate the PCA9634.



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Fig 1. PCA9634 demo board (OM13327) mounting to the I2C 2005-1 demo board

## 5. Hardware description

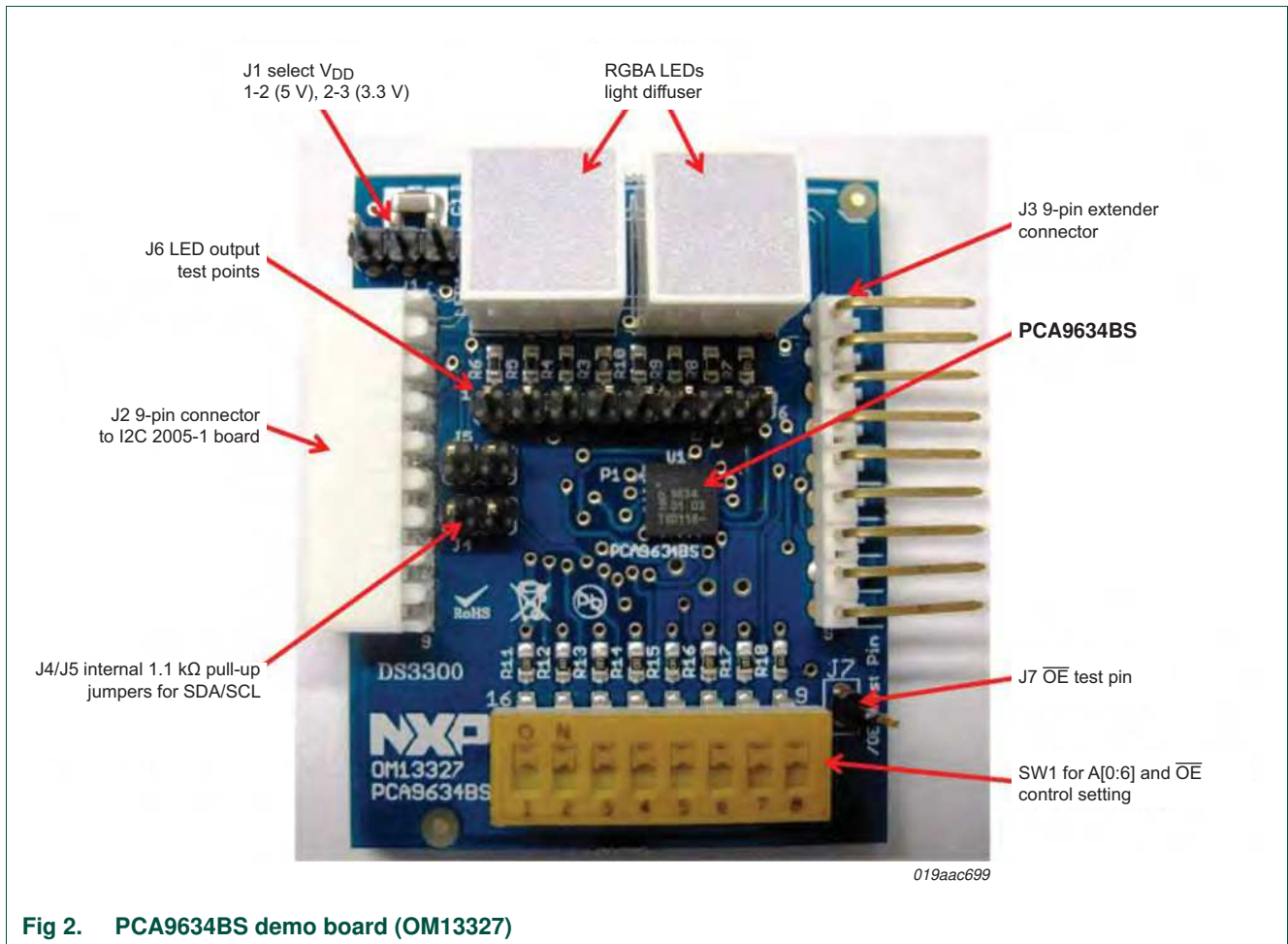


Fig 2. PCA9634BS demo board (OM13327)

The OM13327 board has following jumper headers:

- J2 is for connection to JP1 on I2C 2005-1 demo board.
- J6 allows monitoring all 8 LED output signals.
- J3 is for pass-through signals from the I2C 2005-1 demo board to connect in series with other I<sup>2</sup>C-bus demo boards.
- J1 is used for power supply selection, connected 1-2 for  $V_{DD} = 5\text{ V}$  and connected 2-3 for  $V_{DD} = 3.3\text{ V}$ .
- J4 and J5 for internal 1.1 k $\Omega$  pull-up resistors option on SDA and SCL signals.
- J7 allows monitoring and control output enable ( $\overline{OE}$ ) input signal.
- SW1 8-position DIP switch to select I<sup>2</sup>C-bus address  $A[0:6] = SW1[1:7]$  for this device and set output enable  $\overline{OE} = SW1[8]$ .

6. Schematic

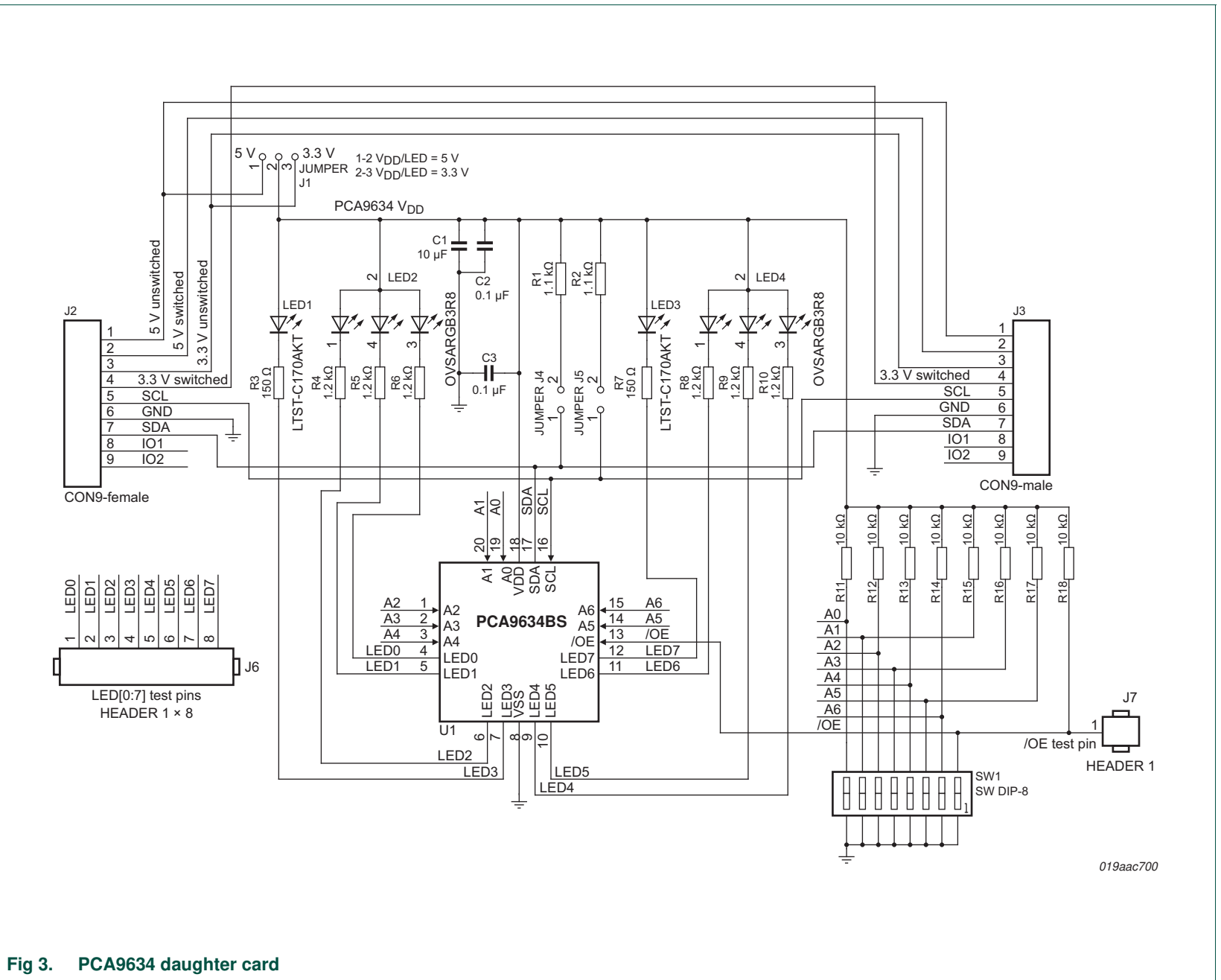


Fig 3. PCA9634 daughter card

## 7. OM13327 demonstration board main components

Table 1. OM13269 demo board main components

Device	Description	Address	Location
PCA9634BS	8-bit Fm+ I <sup>2</sup> C-bus low power LED driver	0xC4 for I2C 2005-1 interface	U1

## 8. PCA9634 evaluation steps

The PCA9634 functions are controlled by WIN-I2CUSB Lite GUI. Refer to the PCA9634 data sheet for additional information on the registers and functionality.

### 8.1 Color mixing and dimming LEDs

1. Connect the hardware as described in [Section 4](#). The PCA9634 address is set to 0xC4 on SW1 as A[0:6] = SW1[1:7] = 0100011 (0 → ON, 1 → OFF).
2. Start the GUI software.
3. The main screen will appear.
4. From the 'Device' drop-down menus select 'LED Blinkers and Dimmers', and from the subsequent drop-down menu select 'PCA9634 8-bit LED driver with 8-bit PWM' as in [Figure 4](#).
5. The device configuration screen will be displayed as in [Figure 5](#).
6. Un-check the 'Sleep Enabled (oscillator off)' box to enable the device, check the 'Auto Write' box (lower right), and click the 'Write All' button.
7. Go to the LED Driver Outputs (LEDOUT) pull-down tabs and for LED0 to LED7 select 'LEDn controlled by PWMn and GRPPWM'.
8. With the cursor, move the PWMn bars in PWM Registers to change the colors on the OM13327 board.
  - PWM0 controls the blue LED2.
  - PWM1 controls the green LED2.
  - PWM2 controls the red LED2.
  - PWM3 controls the amber LED1.
  - PWM4 controls the blue LED4.
  - PWM5 controls the green LED4.
  - PWM6 controls the red LED4.
  - PWM7 controls the amber LED3.
9. Once you set a color with the PWM values, move the GRPPWM bar in Group Registers and observe the dimming effect as in [Figure 6](#).



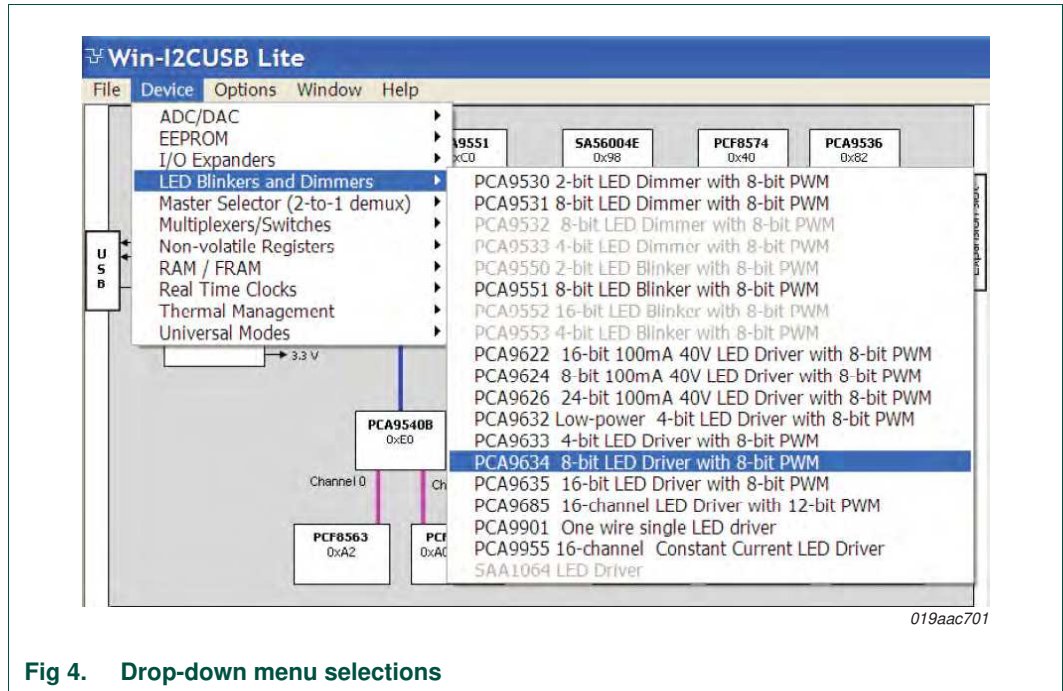


Fig 4. Drop-down menu selections

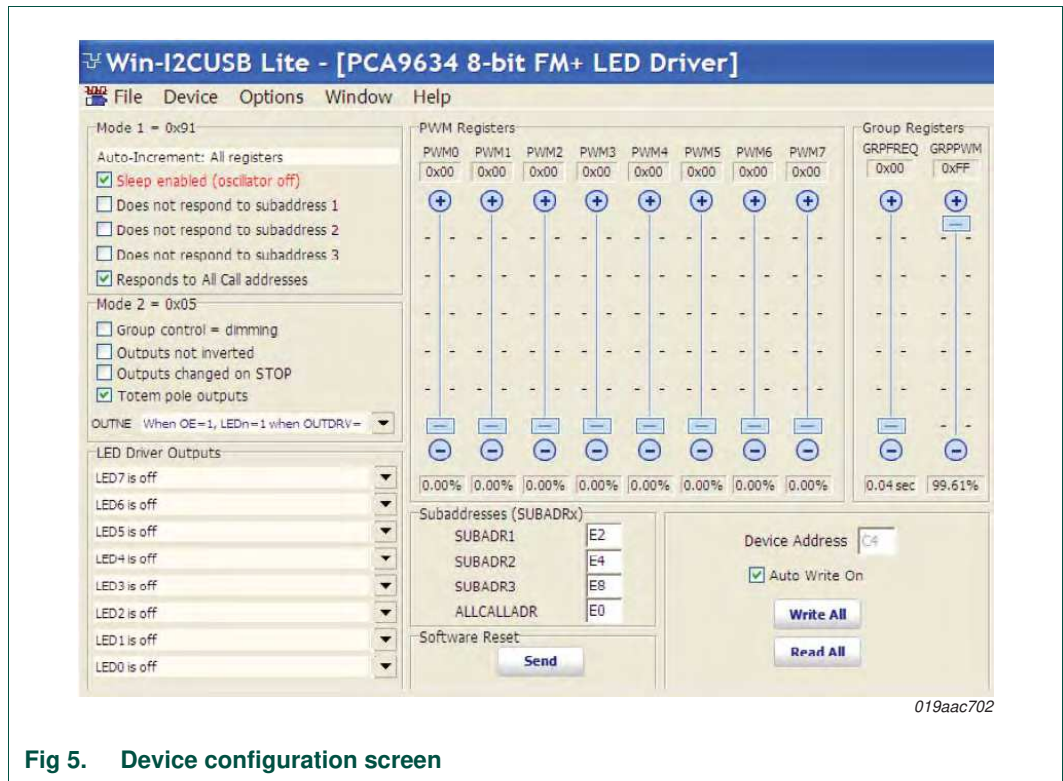


Fig 5. Device configuration screen

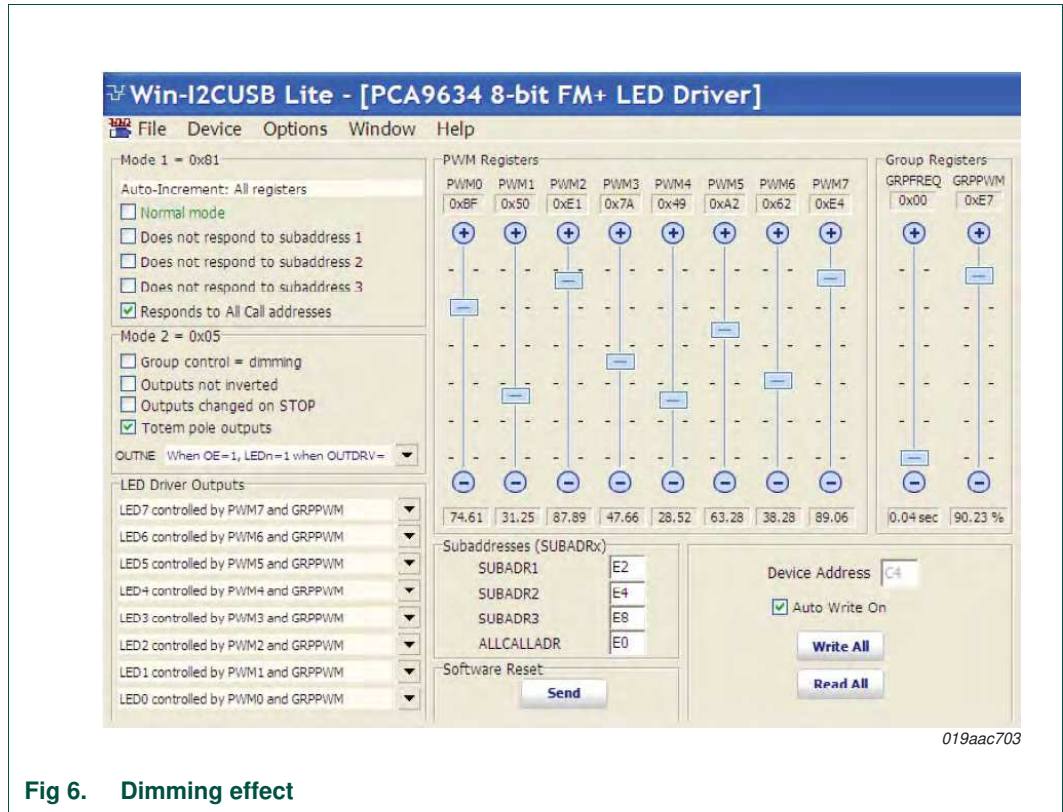


Fig 6. Dimming effect

## 8.2 Color mixing and blinking LEDs

To set-up a blinking demo, repeat step 1 through step 7 as in [Section 8.1](#), then do the following:

1. In the Mode 2 (0x25) selection window, check the 'Group Control' box to change the mode to blinking.
2. With the cursor, move the PWMn bars in PWM Registers to select a color.
3. To set a blink cycle, use the GRPPWM bar to select the duty cycle and use the GRPFREQ bar to select the blink frequency in Group Registers.
4. For example, set the GRPPWM to 0xE7 (90.23 % duty cycle) and the GRPFREQ to 0x2F (2 second) for a short blink every two seconds (see [Figure 7](#)).
5. Change the GRPPWM to 0x80 (50 % duty cycle) and the LED will be on for one second, repeating every two seconds.
6. Change the color of the LEDs by selecting a different PWM value for each LED.
7. Set the GRPPWM to 0x52 (32 % duty cycle) and the GRPFREQ to 0x01 (0.08 second) and observe the pattern.
8. Change the PWMn values, GRPPWM and GRPFREQ values to create different blink patterns.
9. Change the LEDOUT register on one LED output to be controlled only by its PWM, for example, 'LED1 controlled by PWM1' and 'LED6 controlled by PWM6'.
10. Change the blink rate and observe the results (blinking with two different colors on each LED).

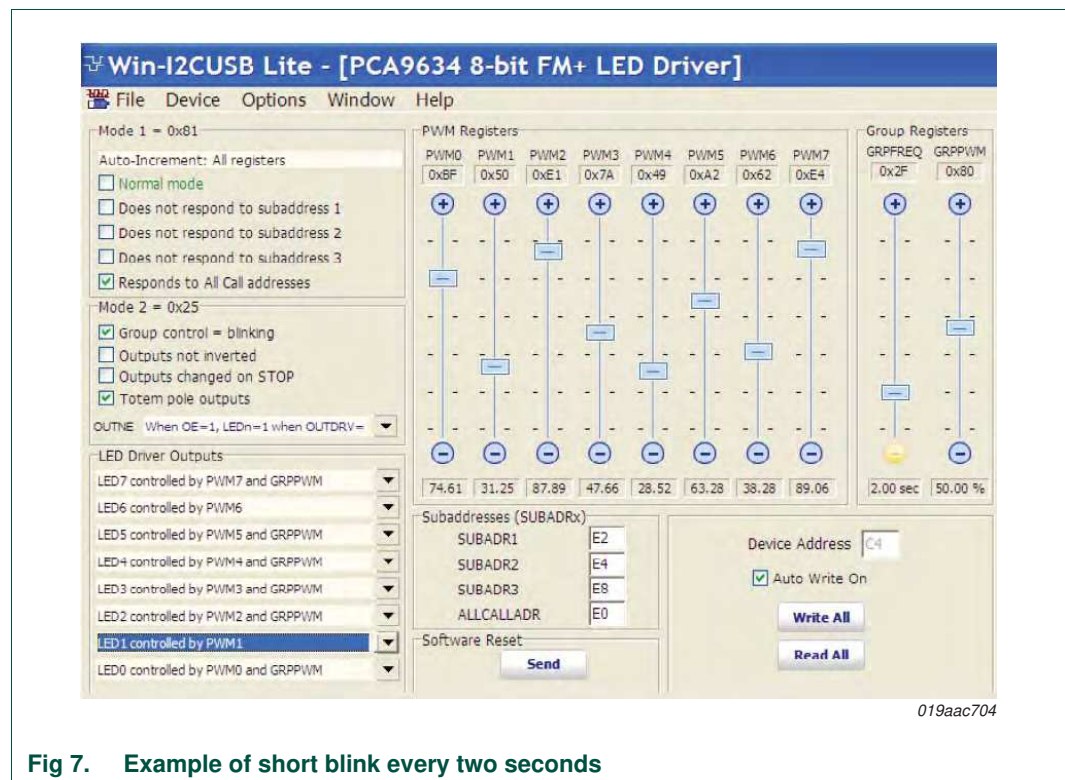


Fig 7. Example of short blink every two seconds

## 9. Support

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For support, please send an e-mail to: [i2c.support@nxp.com](mailto:i2c.support@nxp.com).

## 10. Abbreviations

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**Table 2. Abbreviations**

Acronym	Description
ESD	ElectroStatic Discharge
GUI	Graphical User Interface
I <sup>2</sup> C-bus	Inter-Integrated Circuit bus
IC	Integrated Circuit
LED	Light-Emitting Diode
PC	Personal Computer
PWM	Pulse Width Modulator
RAM	Random Access Memory
RGB	Red/Green/Blue
RGBA	Red/Green/Blue/Amber
SMBus	System Management Bus
USB	Universal Serial Bus

## 11. References

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- [1] **PCA9634, 8-bit Fm+ I<sup>2</sup>C-bus LED driver** — Product data sheet; NXP Semiconductors; [www.nxp.com/documents/data\\_sheet/PCA9634.pdf](http://www.nxp.com/documents/data_sheet/PCA9634.pdf)
- [2] **UM10206, “I<sup>2</sup>C Demonstration Board 2005-1 Quick Start Guide”** — NXP Semiconductors; [www.nxp.com/documents/user\\_manual/UM10206.pdf](http://www.nxp.com/documents/user_manual/UM10206.pdf)

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