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UM10528

PCA9632 demonstration board OM13269

Rev. 1 — 30 January 2012

User manual

Document information

| Info | Content |
|-----------------|---|
| Keywords | I2C, PCA9632, RGB, RGBA, 4 x 8-bit PWM |
| Abstract | The OM13269 is an add-on to the NXP I2C 2005-1 demo board. This daughter board makes it easy to test and design with the PCA9632, a 4-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

| Rev | Date | Description |
|------------|-------------|------------------------------|
| v.1 | 20120130 | user manual; initial release |

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1. Introduction

The PCA9632 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 I²C-bus demo boards to create an evaluation system.

The IC communicates to the host via the industry standard I²C-bus/SMBus port. The evaluation software runs under Microsoft Windows PC platform.

2. Features

- A complete evaluation platform for the PCA9632 4-bit low power LED driver
- Easy to use GUI based software demonstrates the capabilities of the PCA9632
- 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

3.1 Assumptions

Familiarity with the I²C-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 OM13269 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 OM13269 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/.

4.2 OM13269 connection to I2C 2005-1 board

The I2C 2005-1 demo board should be disconnected from your PC before mounting the OM13269 board on to it. The OM13269 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 OM13269 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 PCA9632.

5. Hardware description

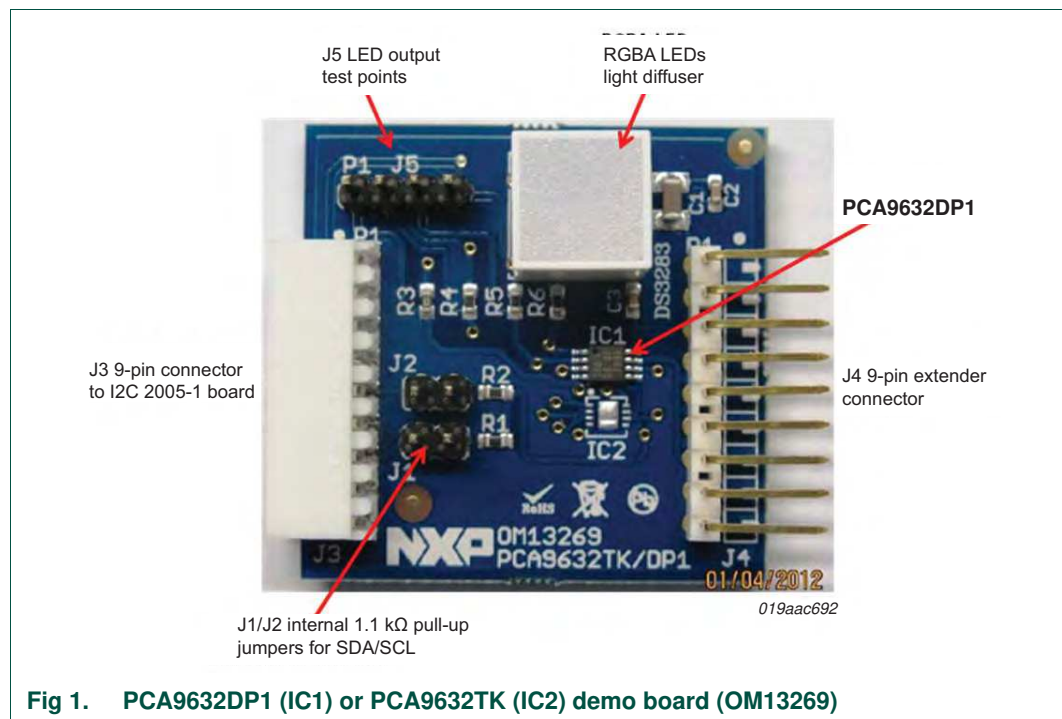


Fig 1. PCA9632DP1 (IC1) or PCA9632TK (IC2) demo board (OM13269)

The OM13269 board has following jumper headers:

- J3 is for connection to JP1 on I2C 2005-1 demo board.
- J5 allows monitoring 4 LED output signals.
- J4 is for pass-through signals from the I2C 2005-1 demo board to connect in series with other I²C-bus demo boards.
- IC2 is an unpopulated area for signal access. All I²C-bus, LED signals are available.
- J1 and J2 for internal 1.1 kΩ pull-up resistors option on SDA and SCL signals.

6. Schematic

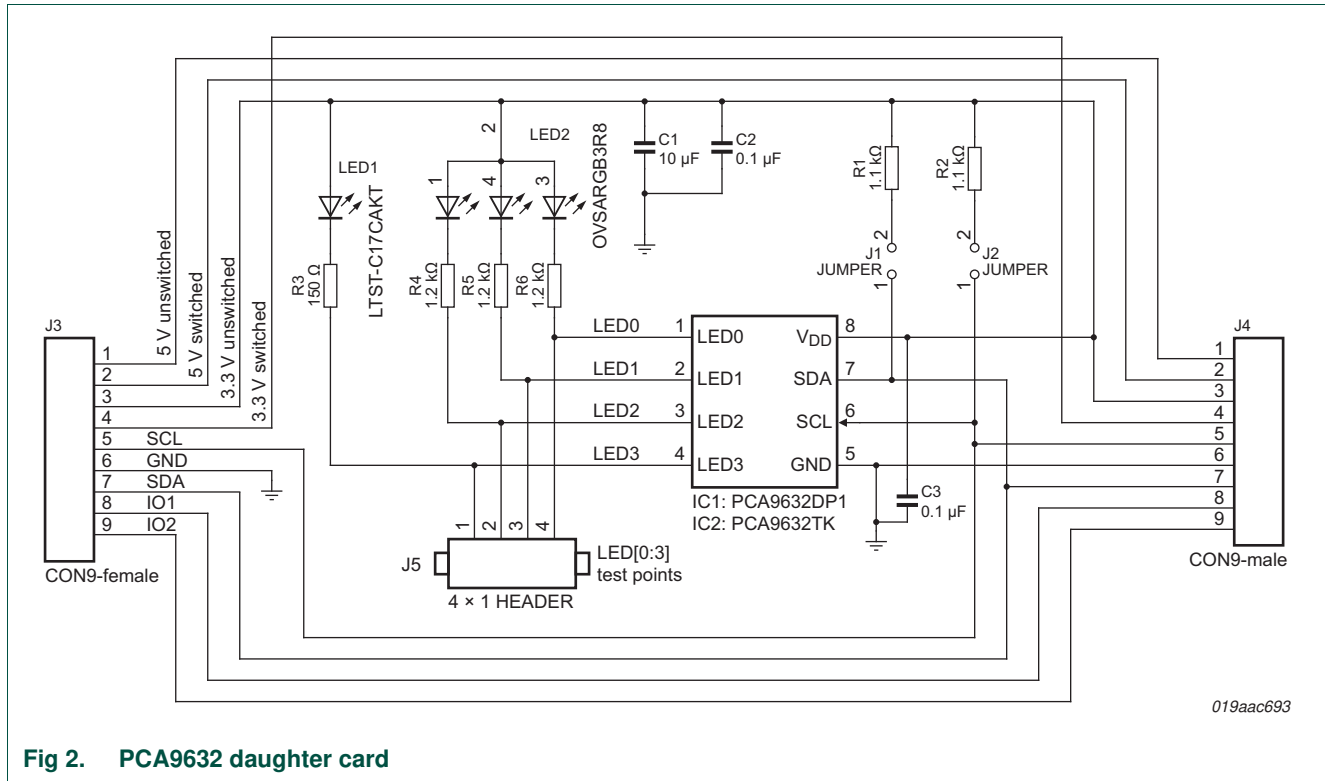


Fig 2. PCA9632 daughter card

7. OM13269 demonstration board main components

Table 1. OM13269 demo board main components

| Device | Description | Address | Location |
|------------|--|-------------------------------|----------|
| PCA9632DP1 | 4-bit Fm+ I ² C-bus low power | 0xC4 for I2C 2005-1 interface | IC1 |
| PCA9632TK | LED driver | | IC2 |

8. PCA9632 evaluation steps

The PCA9632 functions are controlled by WIN-I2CUSB Lite GUI. Refer to the PCA9632 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 PCA9632 address is fixed to 0xC4.
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 'PCA9632 low power 4-bit LED driver with 8-bit PWM' as in [Figure 3](#).
5. The device configuration screen will be displayed as in [Figure 4](#).
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 LED3 select 'LEDn controlled by PWMn and GRPPWM'.
8. With the cursor, move the PWMn bars in PWM Registers to change the colors on the OM13269 board.
 PWM0 controls the blue LED.
 PWM1 controls the green LED.
 PWM2 controls the red LED.
 PWM3 controls the amber LED.
9. Once you set a color with the PWM values, move the GRPPWM bar in Group Registers and observe the dimming effect ([Figure 5](#)).

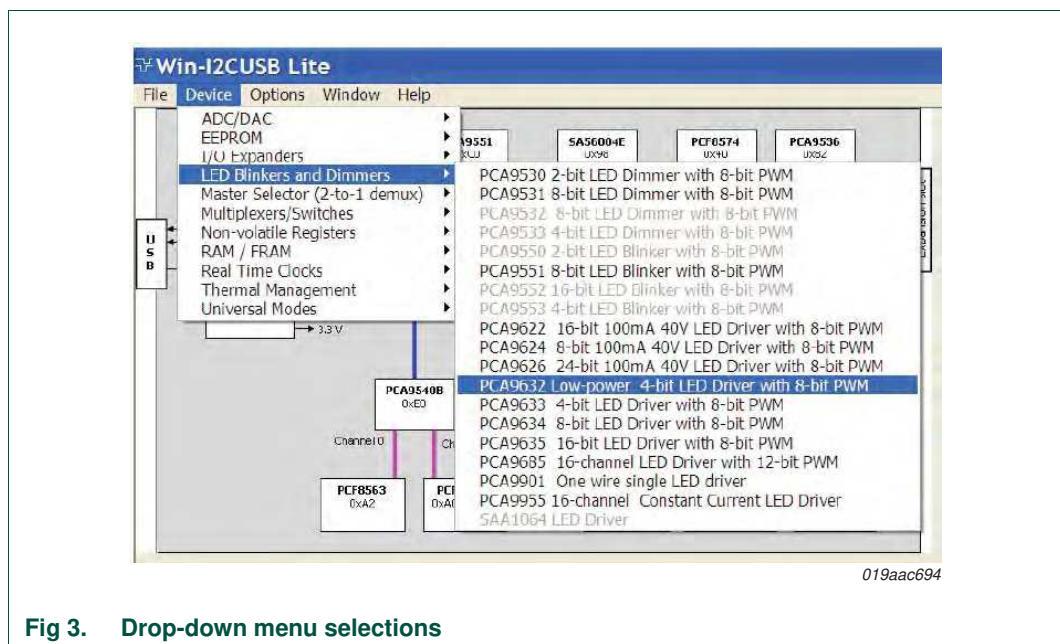


Fig 3. Drop-down menu selections

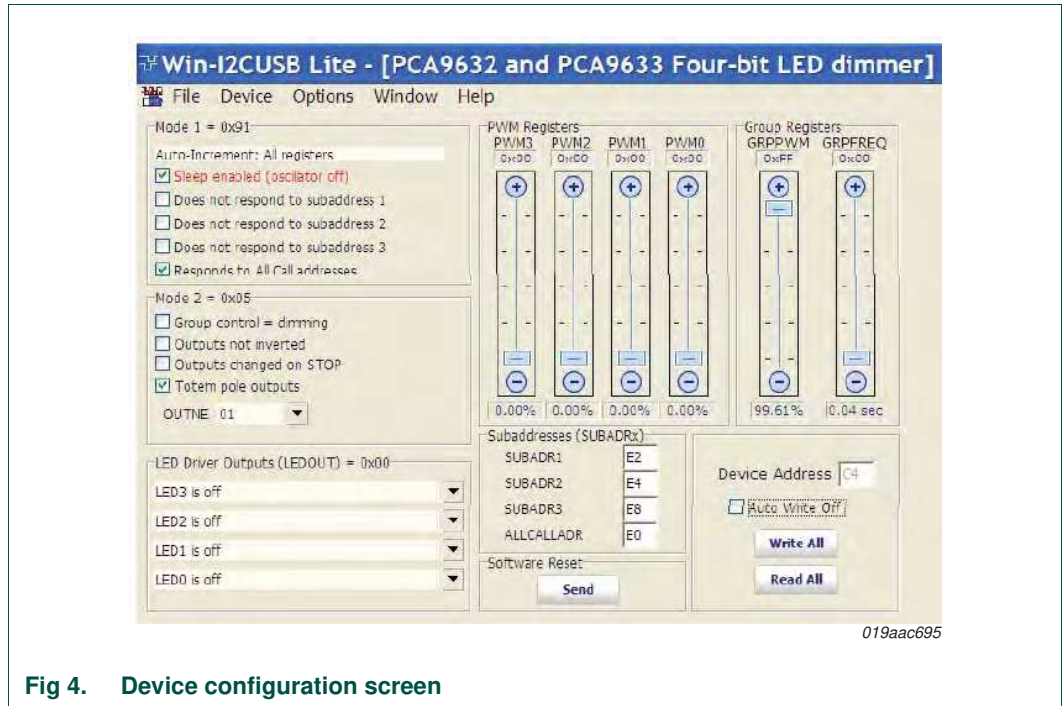


Fig 4. Device configuration screen

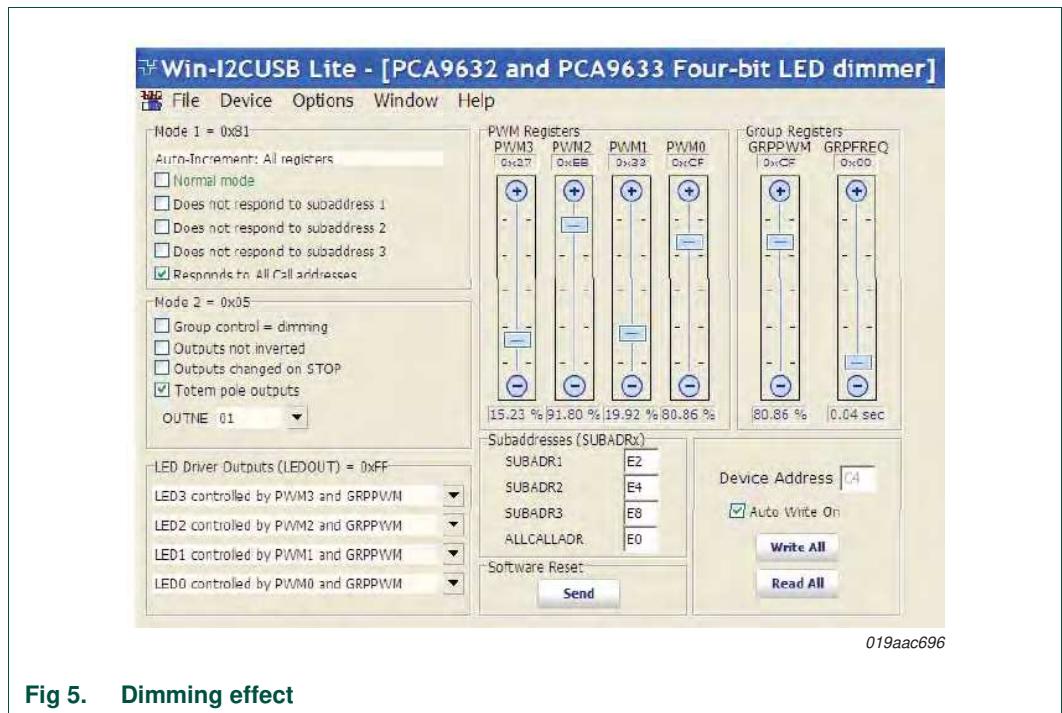


Fig 5. Dimming effect

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 0xCF (80.86 % duty cycle) and the GRPFREQ to 0x2F (2 second) for a short blink every two seconds (see [Figure 6](#)).
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'.
10. Change the blink rate and observe the results (blinking with two different colors).

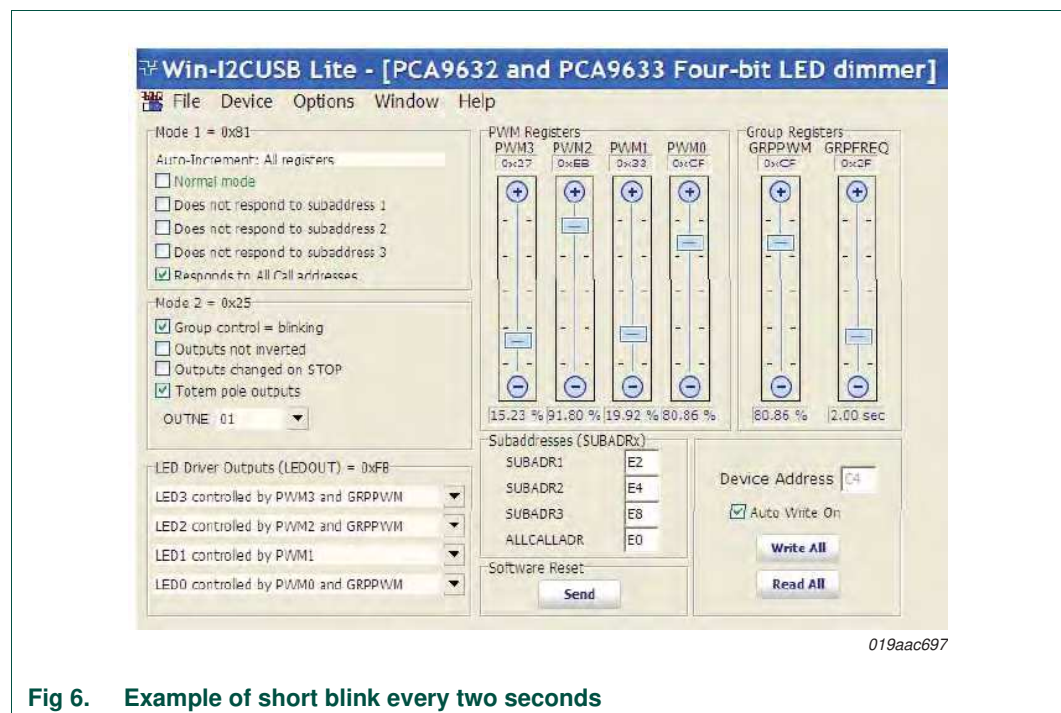


Fig 6. Example of short blink every two seconds

9. Support

For support, please send an e-mail to: i2c.support@nxp.com.

10. Abbreviations

Table 2. Abbreviations

| Acronym | Description |
|----------------------|------------------------------|
| ESD | ElectroStatic Discharge |
| GUI | Graphical User Interface |
| I ² 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

- [1] **PCA9632, 4-bit Fm+ I²C-bus low power LED driver** — Product data sheet; NXP Semiconductors; www.nxp.com/documents/data_sheet/PCA9632.pdf
- [2] **UM10206, “I2C Demonstration Board 2005-1 Quick Start Guide”** — NXP Semiconductors; www.nxp.com/documents/user_manual/UM10206.pdf

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