

www.maxim-ic.com

GENERAL DESCRIPTION

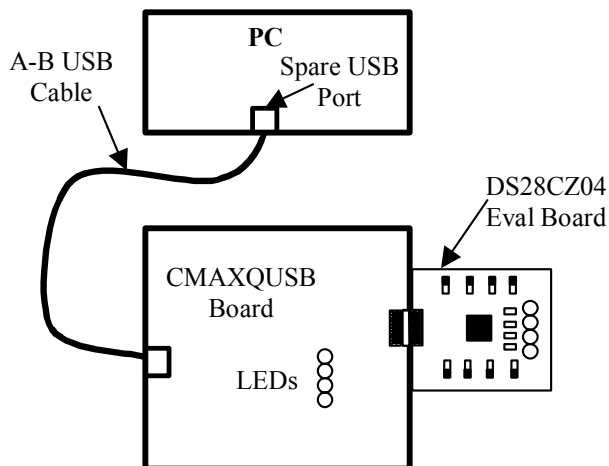
The DS28CZ04 evaluation system (EV system) consists of a DS28CZ04 evaluation board (EV board) and a Maxim CMAXQUSB command module. The DS28CZ04 is a 4Kbit EEPROM with four Nonvolatile PIO using the industry standard I²C and SMBus interface. The memory is organized as two segments of 256 bytes. Individual PIO lines may be configured as inputs or outputs. The power-on state of PIO programmed as outputs is store in nonvolatile memory. The evaluation software runs under Windows[®] XP or 2000, providing a handy user interface to exercise the features of the DS28CZ04.

DS28CZ04EVKIT is the order number for a complete EV system for comprehensive evaluation of the DS28CZ04 using a PC.

EQUIPMENT NEEDED

1. Windows PC running XP or 2000
2. Spare USB port on the PC.

TYPICAL SETUP (NOT TO SCALE)



FEATURES

- Proven PC Board Layout
- Complete Evaluation System
- Convenient On-Board Test Points
- Fully Assembled
- Downloadable Evaluation Software

ORDERING INFORMATION

The DS28CZ04 EV software is designed for use with the complete EV system DS28CZ04EVKIT (includes CMAXQUSB module together with DS28CZ04EVBD).

PART	TEMP RANGE	INTERFACE TYPE
DS28CZ04EVKIT	0 to +70°C	Windows software, USB

PARTS LIST

PART	QTY	DESCRIPTION
DS28CZ04EVBD	1	DS28CZ04 evaluation board
CMAXQUSB	1	Command module and cable

ON-LINE RESOURCES

1. DS28CZ04 datasheet: <http://www.maxim-ic.com/DS28CZ04>
2. CMAXQUSB User's Guide: http://www.maxim-ic.com/quick_view2.cfm/qv_pk/5034

Windows is a registered trademark of Microsoft Corp.

I²C is a trademark of Philips Corp. Purchase of I²C components from Maxim Integrated Products, Inc., or one of its sublicensed Associated Companies, conveys a license under the Philips I²C Patent Rights to use these components in an I²C system, provided that the system conforms to the I²C Standard Specification as defined by Philips.

Note: Some revisions of this device may incorporate deviations from published specifications known as errata. Multiple revisions of any device may be simultaneously available through various sales channels. For information about device errata, click here: www.maxim-ic.com/errata.

DS28CZ04 EV BOARD

The DS28CZ04EVBD provides a proven PC board layout to facilitate evaluation of the DS28CZ04. It must be interfaced to appropriate timing signals for proper operation. The DS28CZ04 EV board is a simple circuit with the DS28CZ04 located on top of the board and a right-angle 20-pin female connector located on the left-most side of the board. This female 20-pin connector plugs into the CMAXQUSB command module and connects power (VC), ground return (GN), data (SD), and clock (SC) pins of the DS28CZ04. See the evaluation board schematic below.

DS28CZ04 EV SYSTEM

The DS28CZ04 evaluation system is defined to be the DS28CZ04 EV board coupled with the CMAXQUSB command module and the evaluation software. The DS28CZ04 EV system board connects to the appropriately labeled pins on the CMAXQUSB command module (see location P3 labeled “MAX SMBus COMPATIBLE INTERFACE”). See Figure 1. The evaluation software runs under Windows XP/2000, interfacing to the EV system board through the computer’s USB port. See the Quick Start section for setup and operating instructions.

Figure 1. CMAXQUSB with DS28CZ04 EV board



QUICK START

- Before beginning, make sure the following equipment is available:
 - DS28CZ04EVKIT (contains DS28CZ04 EV board and CMAXQUSB module)
 - Windows XP/2000 computer with a spare USB port
- Do the following before connecting to the PC:
 - Select 5V logic by setting the CMAXQUSB VDD SELECT jumper.
 - Install the master reset jumper S5 (text label MRZ) to Vcc (jumper center pin to pin on left) and the address jumpers S1 (text label A1) and S2 (text label A2) on the DS28CZ04 eval board. (See Figure 2)
 - Install the write protect S4 (text label WP) jumper to allow writing to the device
 - Connect the eval board to the CMAXQUSB board with the 20-pin connector at location P3 (the I²C/SMBus pins).
- Download the evaluation software from Maxim’s eval kit software page mentioned above or from the eval kit’s quickview: <http://www.maxim-ic.com/DS28CZ04EVKIT>). The evaluation software will be provided as a *.zip archive file. Unzip the archive’s contents into an empty or newly-created directory.
- Connect the USB cable between the CMAXQUSB and the computer. When you plug in the CMAXQUSB board for the first time, the windows plug-and-play system detects the new hardware and automatically runs the Add New Hardware Wizard. Be sure to specify the search location for the device driver, which will be the directory where the evaluation software files were unzipped.
- During device driver installation, Windows displays a warning message indicating that the device driver Dallas Semiconductor Maxim uses does not contain a digital signature. This is not an error condition. It is safe to proceed with the installation.
- The Microsoft .NET framework Version 1.1 is required for the program to run. If it is not installed, please see the following website for download and installation instructions: http://msdn.microsoft.com/netframework/downloads/framework1_1/
- Start the EV Kit software by double-clicking the file, *DS28CZ04_Evaluation_Program.exe*, in the file folder containing the unzipped eval software files.
- If any problems occur during device driver installation, refer to *Application Note 3601: Troubleshooting Windows Plug-and-Play and USB for Maxim Evaluation Kits* for more details. It is located here: http://www.maxim-ic.com/appnotes.cfm/appnote_number/3601.

KIT USAGE

The following kit usage examples demonstrate what steps to take to utilize the different features of the DS28CZ04.

Setup

- Install the files as described in the Quick Install section.
- Install the master reset jumper S5 (text label MRZ) to Vcc (jumper center pin to pin on left)
- Set the desired physical slave address by changing the S1 (text label A1) and S2 (text label A2) switches for address lines A1 and A2. Note that the A1 or A2 pin can be shorted ground (jump center pin to pin on left) or Vcc (jump center pin to pin on right) (See Figure 2. Jumper Examples)
- Install the write protect S4 (text label WP) jumper to allow writing to the device
- Plug in DS28CZ04 eval board to CMAXQUSB SMBus interface connector
- Plug in CMAXQUSB board using provided USB cable

PIO Output

- Complete setup
- Select the “Lower Memory Segment” in the I2C Slave address panel.
- Remove jumper from corresponding input GPIO switch control to allow output control. For example to setup PIO3 as an output remove jumper on S3 (text label GPIO3) (See Figure 2. Jumper Examples)
- Add jumper to output LED control. For example to setup PIO3 as an LED control, add jumper J1 (text label GPIO3)
- Select the PIO tab for a high-level view of the PIO features. Alternately select the ‘Status’ tab to select bit level PIO features

PIO Input

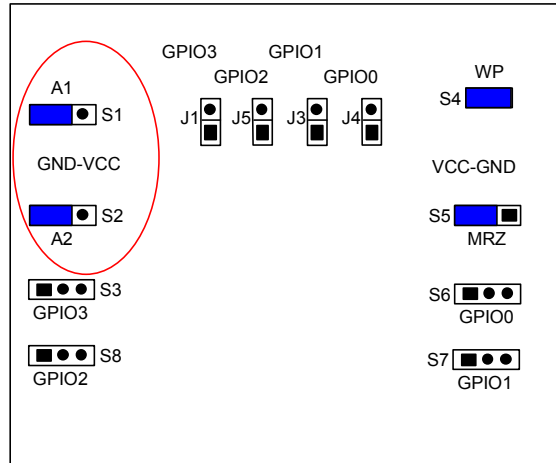
- Complete setup
- Select the “Lower Memory Segment” in the I2C Slave address panel.
- Remove jumper to output LED control. For example to disable PIO1 as an LED control, remove jumper J3 (text label GPIO1) (See Figure 2. Jumper Examples)
- Add jumper to short PIO to either ground or Vcc by using switch. For example to set the input value for PIO1, move the jumper on switch S7 to either short the center pin to ground (on right) or Vcc (on left).
- Select the PIO tab for a high-level view of the PIO features. Alternately select the ‘Status’ tab to select bit level PIO features

Memory

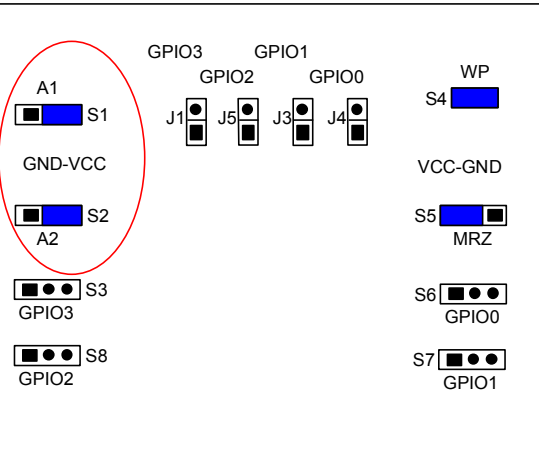
- Complete setup
- Select the “Lower” or “Upper” memory segment in the I2C Slave address panel.
- Select the “Read / Write” tab
- Verify write protect S4 (text label WP) jumper is installed to allow writing to the device
- Set the start address in hex (see reference of addresses at the bottom of the tab)
- Set the number of bytes to transfer, the Read or Write operation radio button
- Click the “Execute Memory Op” to perform the function

Figure 2. Jumper Examples

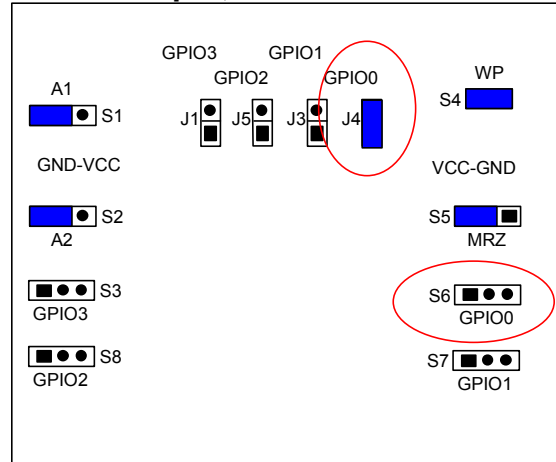
Address A0h/A2h*



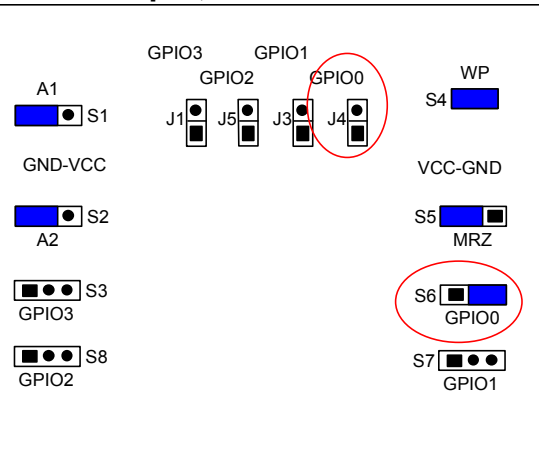
Address ACh/AEh



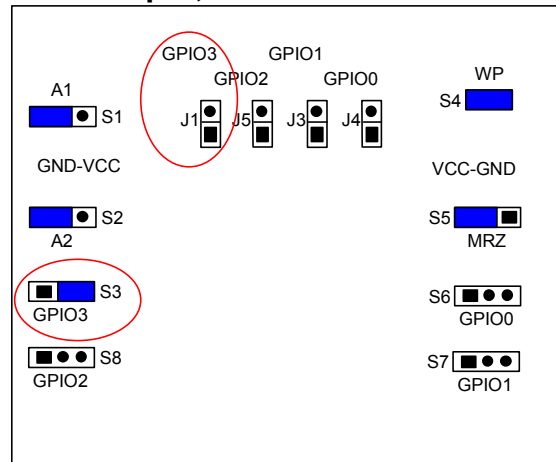
PIO0 – Output, LED Control



PIO0 – Input, Value = LOW



PIO3 – Input, Value = HIGH



*Note: Jumpers are required on S1, S2, S4, and S5 for normal operation of the eval board.

DETAILED DESCRIPTION OF SOFTWARE

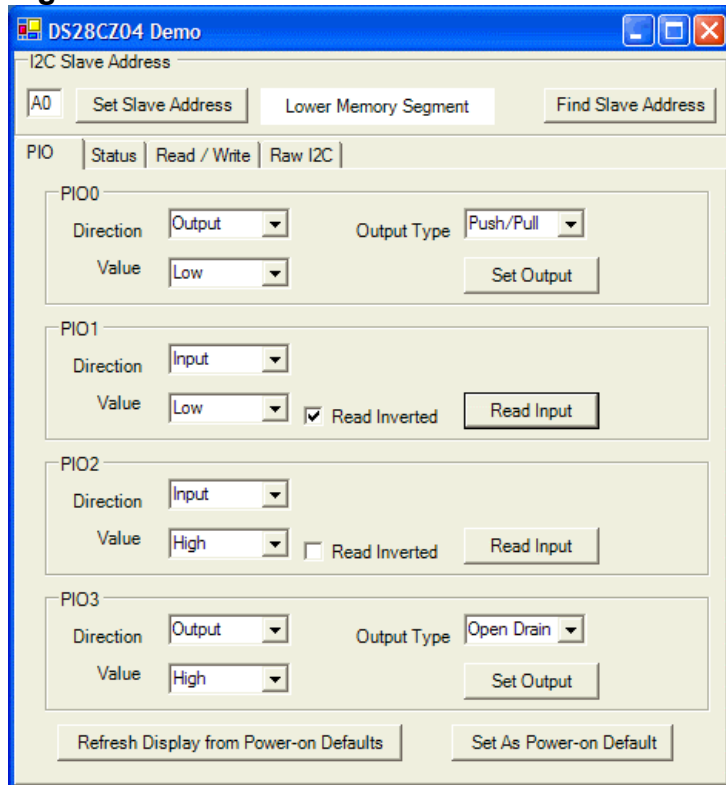
The software is a single screen with multiple tabs that divide the features into logical divisions. The top-most panel allows for the configuration of the device's I2C slave address. If the address is unknown, clicking the "Find Slave Address" button will find and report the first address on the bus that responds. This will be the 'Lower Memory Segment' address referred in the datasheet as "Device Address = A0". The label to the right of the "Set Slave Address" button will indicate whether the upper or lower memory segment is selected. To select the upper memory segment then manually change the hex slave address to set bit 1 and click "Set Slave Address". For example with the default address, set it to A2. See Table 1 below to select the upper memory segment. The address panel is visible while viewing any of the feature specific tabs.

Table 1. Lower/ Upper Memory Segment Address

Lower Memory Segment	Upper Memory Segment
A0	A2
A4	A6
A8	AA
AC	AE

The figure below (Figure 3) shows the first tab with the PIO selection. It provides feature settings for each of the four PIO channels. The PIO direction can be selected (Input, Output). If the PIO is set to "output" then the output type can be selected (Push/Pull, Open Drain) along with the value. For a PIO set to "input", the read value is displayed in the Value field with an optional 'Read Inverted' mode. The button "Set As Power-on Default" will make the settings the power-on default. The "Refresh Display from Power-on Defaults" will set the display options to match the devices power-on defaults. The PIO tab requires that the "Lower Memory Segment" is selected by the slave address.

Figure 3. PIO Tab



The status tab (Figure 4) allows the bit level features of the mode, direction, input/output flags to be set. It displays the raw control and the status registers for the GPIO functionality. The status tab requires that the “Lower Memory Segment” is selected by the slave address. The groups of information found on this tab represent the control/status registers of the DS28CZ04. Each register is laid out such that the value can be set directly or individual bits can be toggled using the appropriate checkbox (in all cases, a ‘checked’ checkbox results in a ‘1’ value for that bit).

The first group of bits represents the control register located at memory address 0x07A. The ADMD (Address Mode), CM (Communication Mode), and SFF (SFF-8472 Mode) bits can all be toggled in this group. The ADMD mode bit determines whether or not the GPIO Input Status and Output control information is stored in 1 memory byte (ADMD=1) or across 4 memory bytes (ADMD=0). The CM bit determines whether the device uses SMBus timeouts (CM=1) or no timeouts (CM=0). The SFF bit selects whether the general-purpose memory address 0x16E contains user data (SFF=0) or the status of TXF and LOS (SFF=1). The BUSY bit is a status bit that is only checked if the DS28CZ04 is in the middle of an EEPROM write cycle. Finally, the DIRn checkbox for the appropriate GPIO pin can be used to set that pin as an input (DIRn=1) or an output (DIRn=0).

The second group of bits represents the control register located at memory address 0x07B. The OTn bits control the output type of each GPIO, where each GPIO can be configured as either an open-drain (OTn=1) or push-pull (OTn=0) output. The IMSKn bits control the Input Inversion Mask for each GPIO, where each input can be optionally inverted (IMSKn=1) or left alone to show the actual line status (IMSKn=0).

The last group of bits represents the GPIO output value control and input value status register(s). If ADMD is set, these values are stored in 1 memory byte at 0x07C, otherwise they are spread across 4 memory bytes from 0x07C to 0x07F. The GIVn bits reflect the current input level on the line whether high (GIVn=1) or low (GIVn=0). The GOVn represents the output level on the line whether it is being driven high (GOVn=1) or driven low (GOVn=0). Note that if the output is configured as an open-drain output, driving the output value high will only result in floating the gate and the input level (if unconnected to another driving device or a pull-up) will be unpredictable.

The “Save Values To Power-On Default” button at the bottom saves the value of SFF, DIRn, GOVn, OTn, and IMSKn to an EEPROM register which is read on power-up to restore the state of these bits.

Figure 4. Status Tab

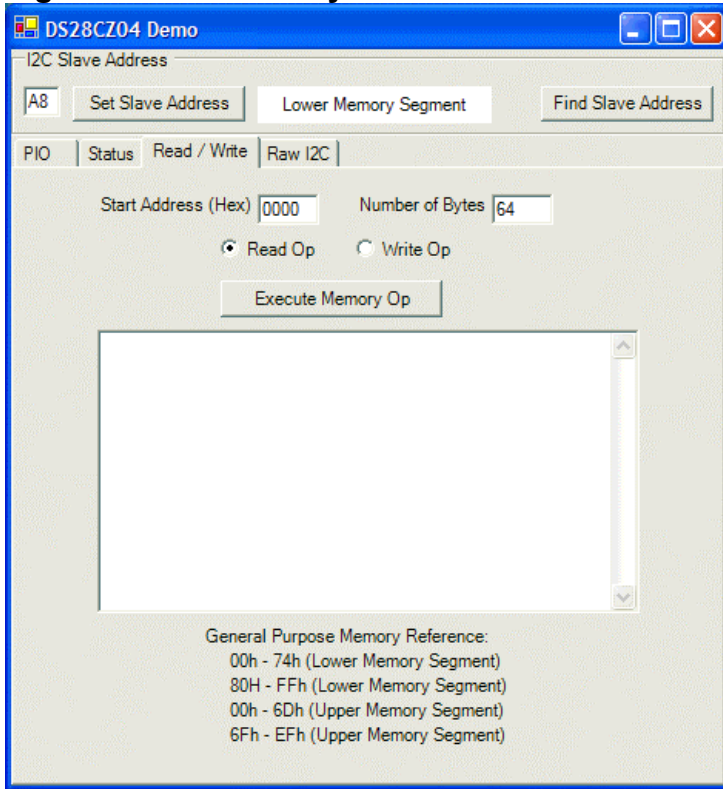
The screenshot shows the DS28CZ04 Demo software interface. At the top, there is a title bar "DS28CZ04 Demo" and a window control bar. Below the title bar, there is a section for "I2C Slave Address" with a text box containing "A8", a "Set Slave Address" button, a radio button for "Lower Memory Segment", and a "Find Slave Address" button. Below this, there are three tabs: "PIO", "Status", and "Raw I2C", with "Status" selected. The main area is divided into three sections:

- Mode And Direction Control Register:** Address 0x07A. It has a text box with "1F", "Read", and "Write" buttons. The "Mode Control" section has checkboxes for ADMD (unchecked), CM (unchecked), BUSY (unchecked), and SFF (checked). The "Output Direction" section has checkboxes for DIR3 (checked), DIR2 (checked), DIR1 (checked), and DIR0 (checked).
- Output Type and Input Mask Control Register:** Address 0x07B. It has a text box with "00", "Read", and "Write" buttons. The "Output Type" section has checkboxes for OT3 (unchecked), OT2 (unchecked), OT1 (unchecked), and OT0 (unchecked). The "Input Mask" section has checkboxes for IMSK3 (unchecked), IMSK2 (unchecked), IMSK1 (unchecked), and IMSK0 (unchecked).
- GPIO Input Status And Output Control Register:** Address 0x07C - 0x07F (MAM) or Address 0x07C (SAM). It has a text box with "F0", "Read", and "Write" buttons. The "Input Status" section has checkboxes for GIV3 (checked), GIV2 (checked), GIV1 (checked), and GIV0 (checked). The "Output Control" section has checkboxes for GOV3 (unchecked), GOV2 (unchecked), GOV1 (unchecked), and GOV0 (unchecked).

At the bottom of the interface, there is a "Save Values To Power-On Default" button.

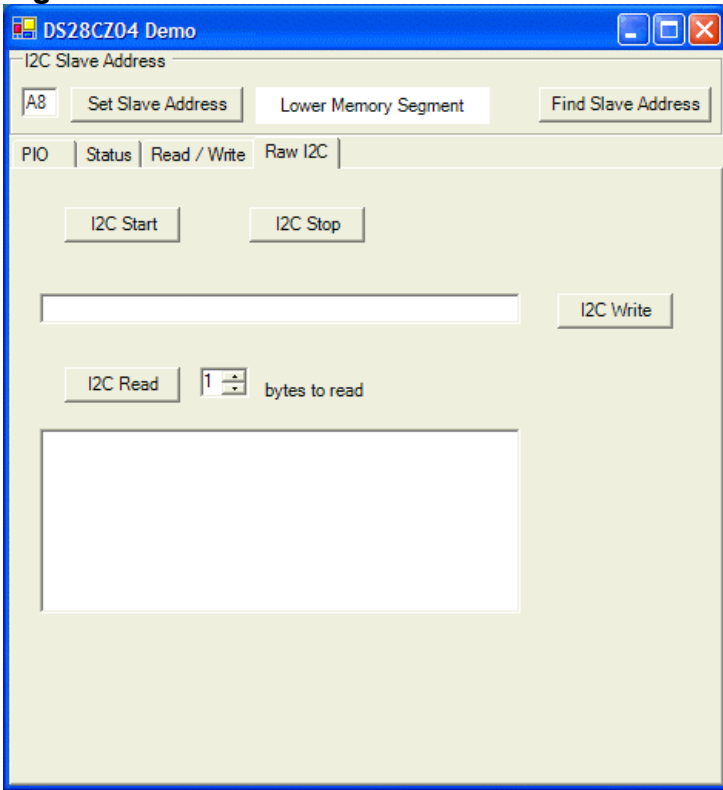
The Read/Write tab (Figure 5) allows easy read or write access to the general-purpose memory areas, as well as the control registers. Simply specify the start address to begin reading from, specify the number of bytes to read, and select "Read Op". Then, click the "Execute Memory Op" button and a hexadecimal representation of the memory contents will be displayed in the large text area. The values can be edited by replacing it with the new memory contents, selecting "Write Op", and clicking the "Execute Memory Op" button.

Figure 5. Raw Memory Read/Write Tab



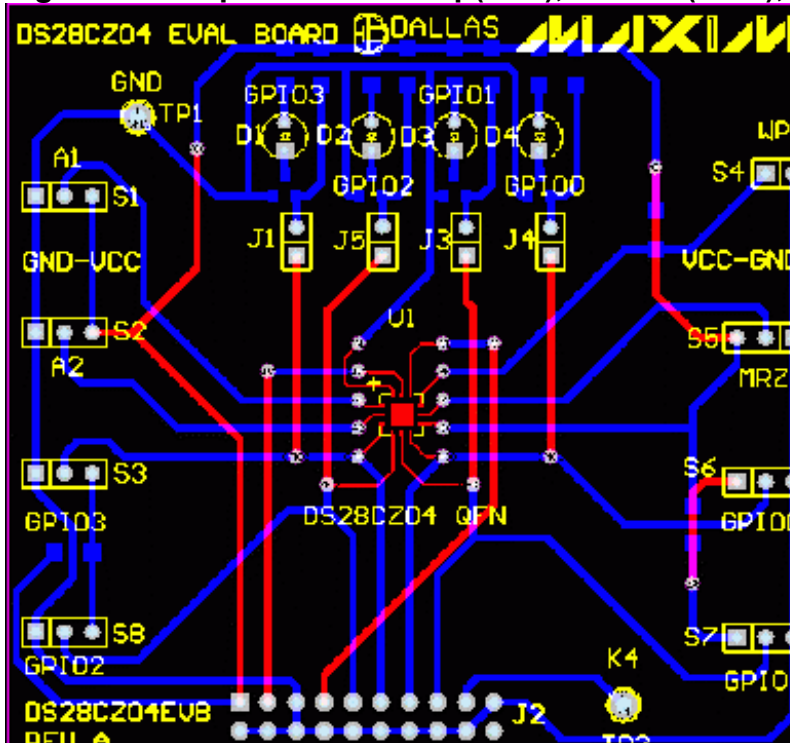
The Raw I2C tab (Figure 6) provides low-level communication tools for the device. It allows for raw I2C commands, including Start, Stop, Write and Read (last byte is always “not acknowledged”). This tab is useful for testing custom I2C communication sequence.

Figure 6. Raw I²C Tab



EVALUATION BOARD LAYOUT

Figure 7. Composite View: Top(Red), Bottom(Blue), Silkscreen



EVALUATION BOARD SCHEMATIC

Figure 8. DS28CZ04 Evaluation Board Schematic

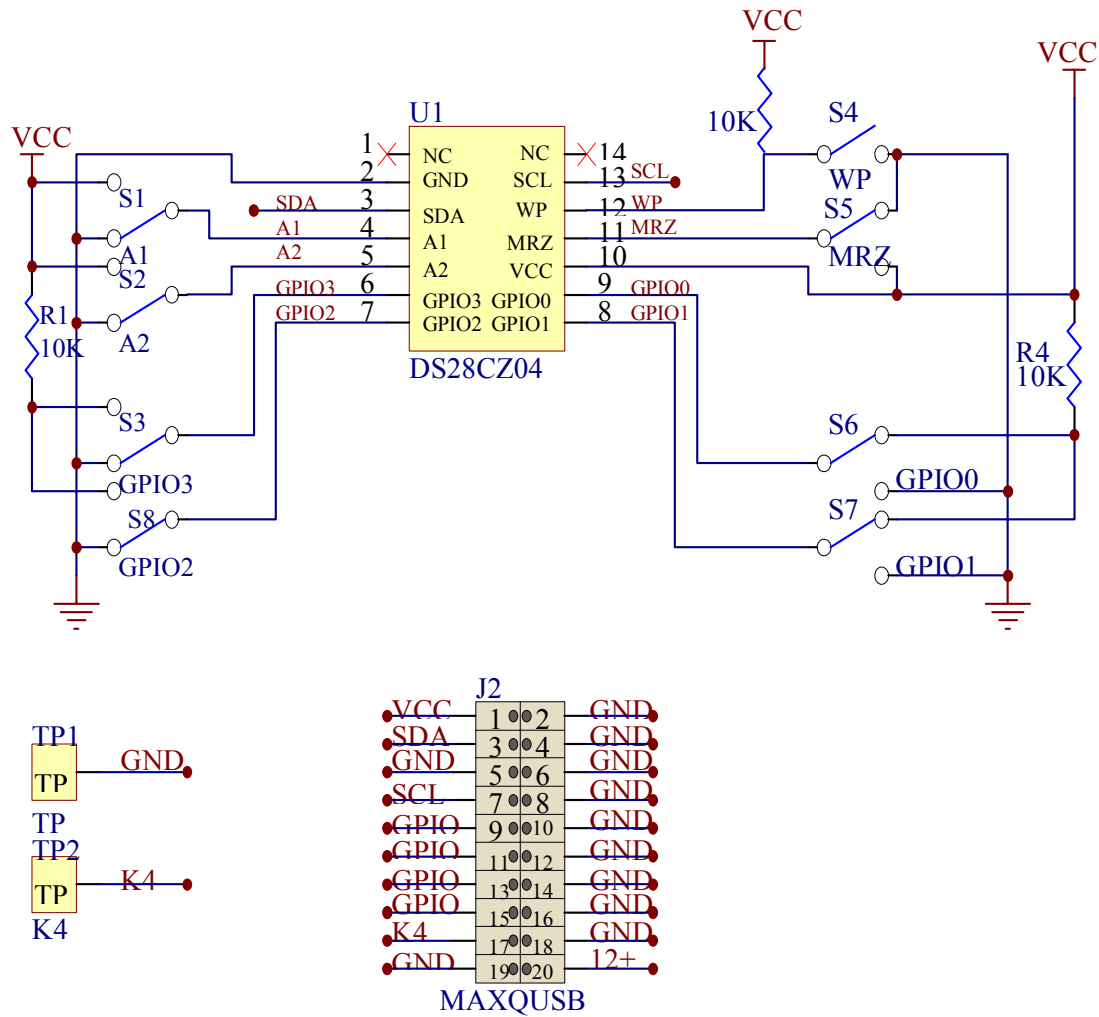
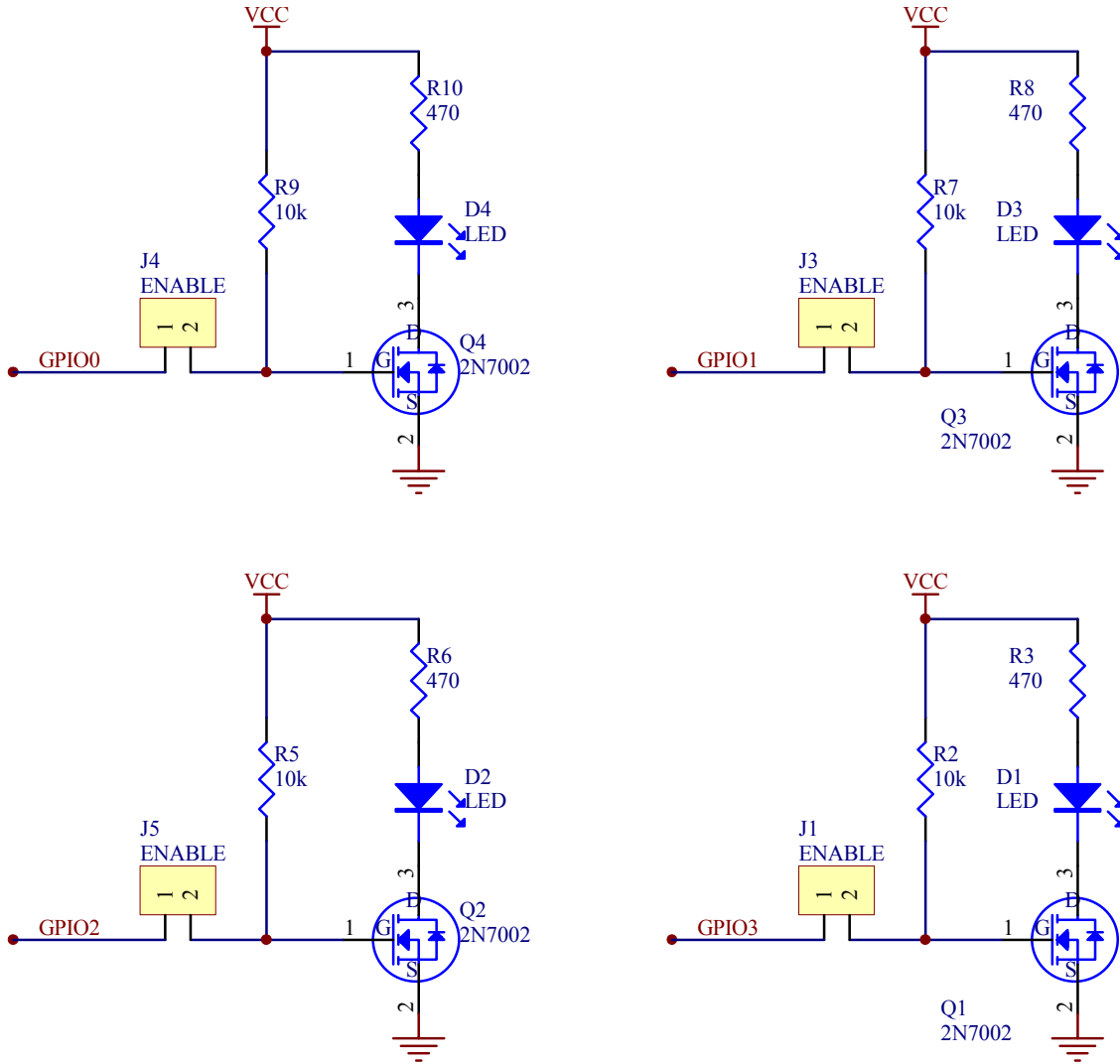


Figure 8. DS28CZ04 Evaluation Board Schematic, Cont.



REVISION HISTORY

- Revision A: Original evaluation kit titled “DS28CZ04EVKIT Evaluation Board/Evaluation System”: 8/07/06
- Correct schematic and composite view to include pull-up on WP. Add text to install WP jumper during setup: 8/25/06