bq2022 Evaluation Software

The bq2022 is a 1 K-bit serial EPROM containing a factory programmed unique 48-bit identification number, 8-bit CRC generation, and an 8-bit family code. A 64-bit status register controls write protection and page redirection.

The purpose of the evaluation software is to demonstrate the functionality of the bq2022. The bq2022 evaluation board can be used for one or two ICs.

The bq2022 is ideal for applications such as battery pack configuration parameters, record maintenance, asset tracking, product revision status, and access-code security.

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1 Kit Contents

1. bq2022, HPA125 revision A board
2. PC interface board EV2201 (with firmware revision 2.5.x)
3. CD-ROM including Windows-based PC software and support documentation
4. RS-232 Cable

2 bq2022EVM Based Circuit Module

The bq2022 based circuit module is ideal for programming the 1 K-bit EPROM and the STATUS bytes of the bq2022 IC. The circuit module includes a 3-pin SOT23 dual socket, a bq2022 IC, a Zener diode for host protection during EPROM programming and a programming circuit that generates a 12 V pulse when used with a power supply and a control signal. In a typical application only the bq2022 IC and a pull-up resistor is required.

2.1 Test Points

Table 1. Test Points

Test Point	SIGNAL NAME	DESCRIPTION
J1-1	SDQ	SDQ single wire communication bus
J1-2	VSS	Device ground
J2-1	12V	High voltage for EPROM programming
J2-2	PROG	Input for timing of EPROM programming pulse
J2-3	VSS	Programming ground
J3		Connect for EPROM programming

3 bq2022EVM Circuit Module Schematic

The schematic shows the circuit for the bq2022EVM implementation.

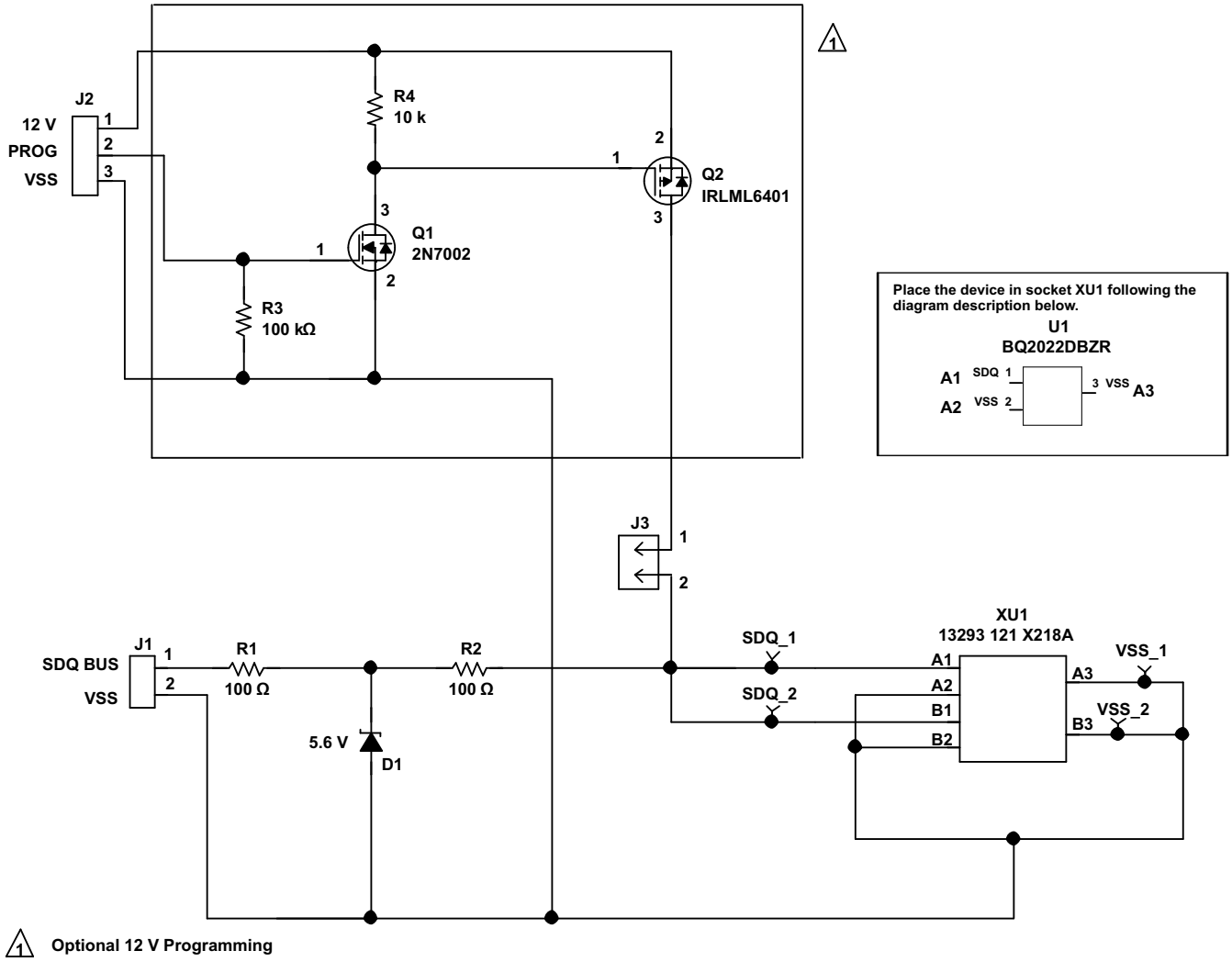

Figure 1. EVM Schematic

4 Circuit Module Physical Layouts

This section contains the board layout and assembly drawings for the bq2022EVM circuit module.

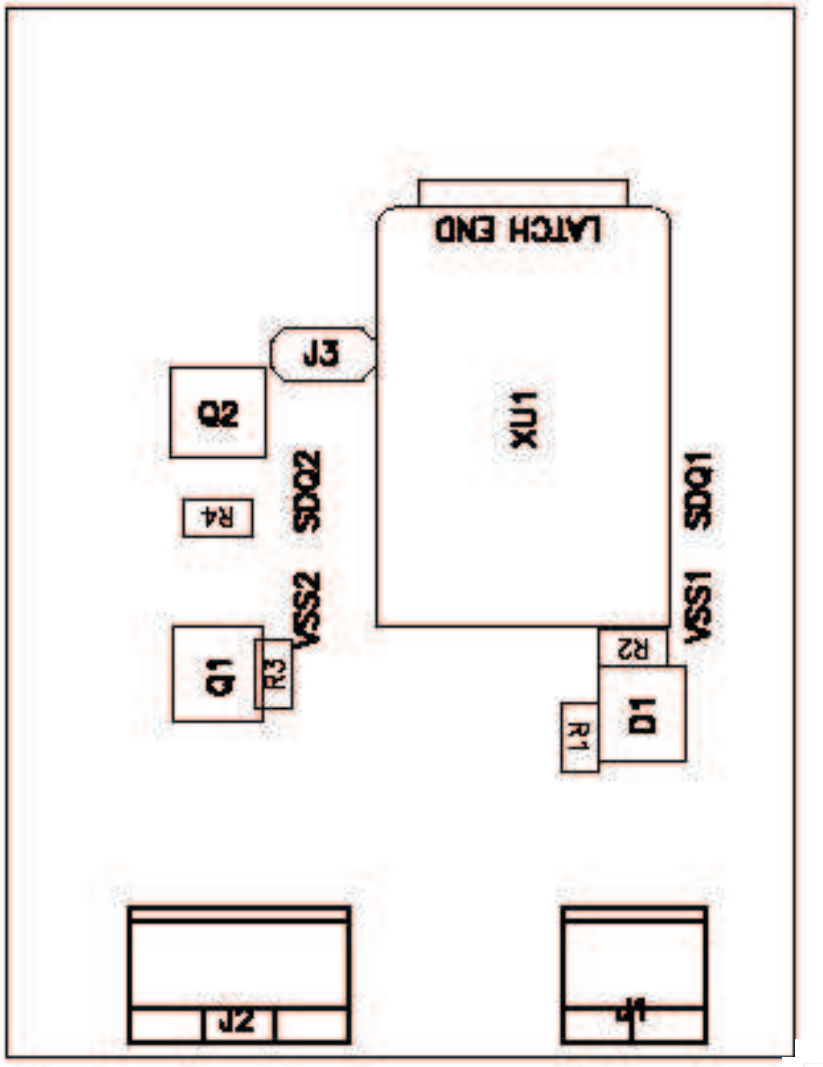

Figure 2. EVM Top Assembly

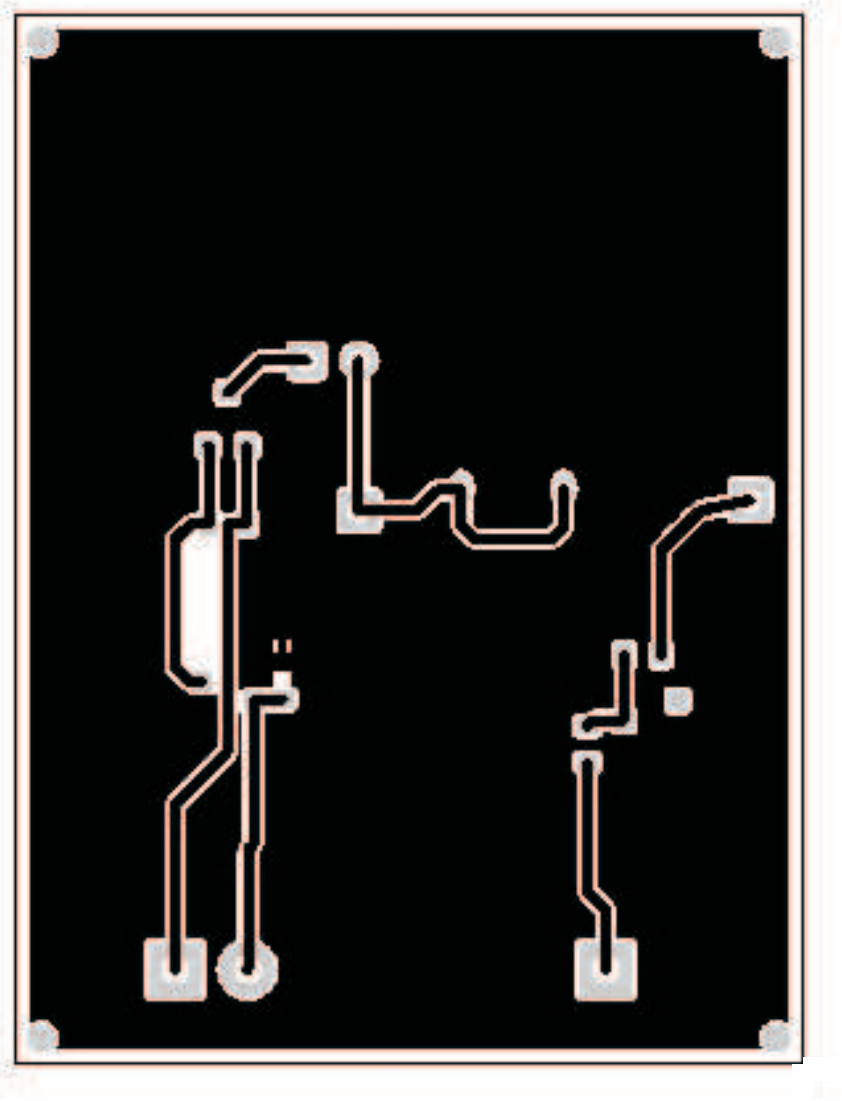

Figure 3. EVM Layer One

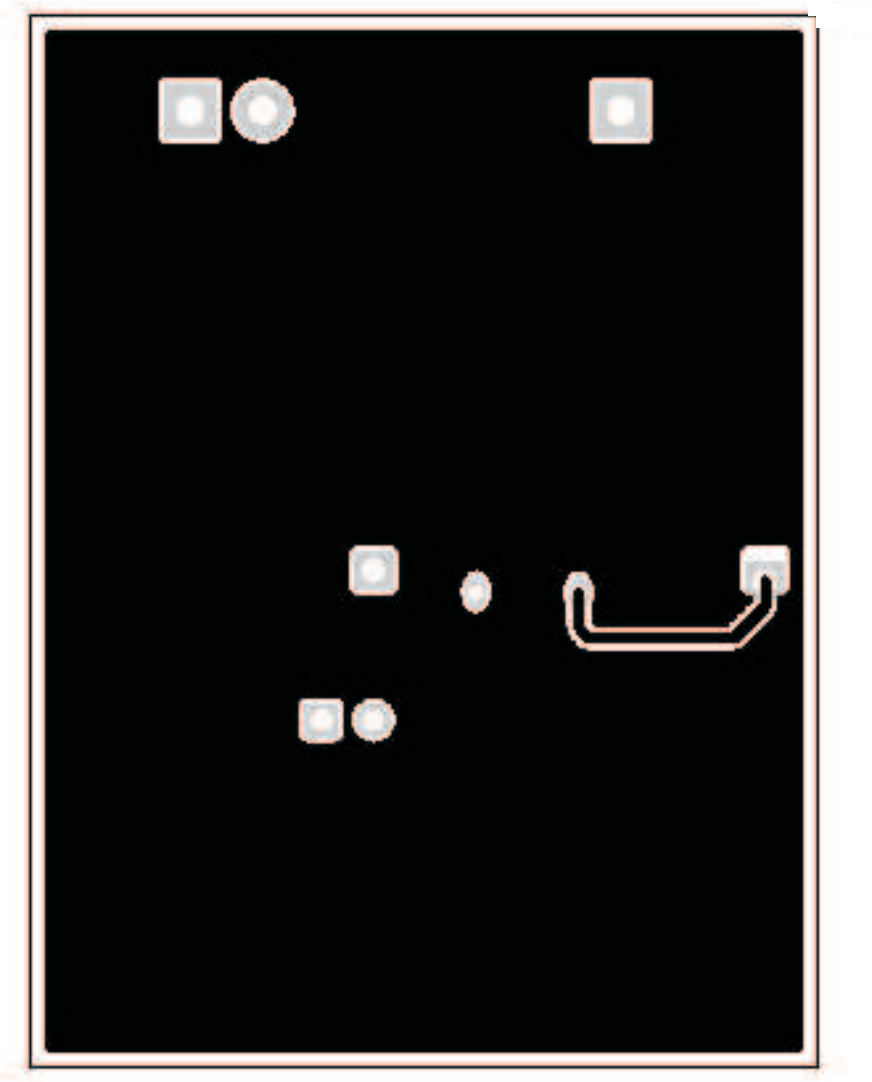

Figure 4. EVM Layer Two

5 bq2022 Circuit Module List of Materials

List of materials required for the bq2022EVM circuit module.

Table 2. List of Materials

REF DES	QTY	DESCRIPTION	MFR	PART NUMBER
D1	1	Diode, Zener, 5.6-V, 350-mW	Diodes, Inc.	BZX84C5V6
J3	1	Header, 2-pin, 100mil spacing, (36-pin strip)	Sullins	PTC36SAAN
R1, R2	2	Resistor, Chip, 100-Ohms, 1/16-W	Std	Std
R3	1	Resistor, Chip, 100k-Ohms, 1/16-W	Std	Std
R4	1	Resistor, Chip, 10k-Ohms, 1/16-W	Std	Std
XU1	1	Socket, Double 3P SOT-23	Loranger	13293 121 X218A
J1	1	Terminal Block, 2-pin, 6-A, 3.5mm	OST	ED1514
J2	1	Terminal Block, 3-pin, 6-A, 3.5mm	OST	ED1515
SDQ1, SDQ2, VSS1, VSS2	4	Test Point, Black, 1mm	Farnell	240-333
Q1	1	MOSFET, N-ch, 60-V, 115-mA, 1.2-Ohms	Vishay-Liteon	2N7002DICT
Q2	1	MOSFET, Pch, -12V,-3.4A, 50 milliohm	IR	IRLML6401
U1	1	IC, 1 K Serial EPROM With SDQ Interface	TI	BQ2022DBZR
–	1	PCB, 2 In x 1.25 In x .125 In	Any	HPA125 Board
N/A	1	Shunt, 100mil, Black	3M	929950-00

6 bq2022EVM Circuit Module Performance Specification Summary

Table 3. Performance Specification Summary

SPECIFICATION	MIN	TYP	MAX	UNITS
Voltage Pull-up (V_{UP})	2.65		5.5	V
Programming Voltage(V_{PP})	11.5		12	V

7 EVM Hardware and Software Setup

7.1 Software Installation

This section describes how to install the bq2022EVM PC software, and how to connect the different components of the EVM.

Use the following steps to install the bq2022 evaluation software:

1. Insert CD ROM into a CD ROM drive.
2. Select the CD ROM drive using *My Computer* or *File Manager*.
3. Double-click on the *Setup.exe* icon that is in the *Software* folder.
4. The setup program installs a windows application group.

7.2 Hardware Connection

There are three hardware components to the bq2022EVM:

1. The bq2022EVM circuit module
2. The PC interface board, (EV2201)
3. The PC

Use the following steps to configure the hardware for interface to the PC:

1. Connect HPA125 board with EV2201 PC interface board using Table 4 as a pin connection guide.
2. Connect the PC RS-232 cable to the EV2201 and the PC serial port.

The bq2022EVM is now set up for normal operation.

Table 4. Wire Connection

bq2022 EVM (HPA125)	EV2201
SDQ	SMBD/HDQ1
VSS	VSS
PROG	E2 VCC

To program the EPROM of bq2022, a 12-V pulse must be generated on the SDQ line. The HPA125 board has an additional circuit included that permits generating this pulse when using a Power Supply set to 12 V and the E2 VCC output of the EV2201. The evaluation software controls this pulse for EPROM programming.

When programming the EPROM it is expected that a 12-V supply must be connected to the HPA125 board at the 12-V input terminal of the HPA125 board. Ensure that the ground of the power supply is connected to VSS of the board.

There is a jumper (J3) that must be connected when using the EPROM programming circuit.

7.2.1 Normal Operation

Normal operation includes performing any of the ROM commands, reading the 1 K-bit EPROM and reading the EPROM Status Memory.

7.2.2 EPROM Programming

To program EPROM registers, it is required to send a 12-V pulse across the SDQ line after sending the code 0x5A during a write command. See the bq2022 data sheet (literature number SLUS526) for a specific description of EPROM programming requirements. When programming EPROM registers the following must be ensured:

- J3 jumper is connected.
- E2 VCC output of EV2201 is connected to PROG input of HPA125 board.
- Power supply set to 12 V is connected across the 12 V and VSS inputs of HPA125 board.

8 Software Operation

Run the program from the ***Start|Programs|Texas Instruments|bq2022 Evaluation Software*** menu sequence.

8.1 Evaluation Software Pages

This section describes the function of each page of the EVSW.

8.2 ROM CMD

This page provides all the ROM commands for bq2022 (see Figure 5).

8.2.1 Sections Within the ROM CMD Page

Application. — This section determines the number of bq2022 devices that are on the SDQ bus. If only one device is used, then select *Single Device*. This option sends the *SKIP ROM* command before any communication attempt is made with the device. If more than one device is used, then select *Multiple Devices*. This option sends the *MATCH ROM* command before any communication attempt is made with the desired device

Search ROM. — This section demonstrates the *SEARCH ROM* command. When there are multiple devices on the SDQ bus, the ROM ID of the devices that share the bus is listed.

Match ROM. — This section is only available when the *Multiple Devices* option is selected in the Application section. To use the *MATCH ROM*, enter the ROM ID of the device of interest in the text box, and then click on the *Select Device* button. This causes the *MATCH ROM* commands with the desired ROM ID to be sent whenever communication is attempted with the desired device. If *SEARCH ROM* is used, the desired ID can be copied from the *SEARCH ROM* list, and then pasted into the *MATCH ROM* text box. Ensure that only the ID numbers are pasted into the text box and not the whole line referring to the device.

Read ROM. — This section is only available when the *Single Device* option is selected in the Application section. The ID ROM of the device on the SDQ communication line is displayed.

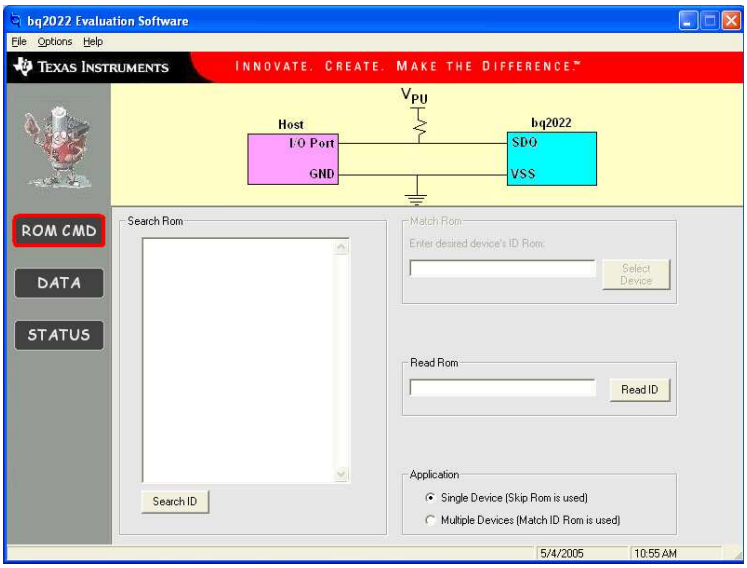

Figure 5. ROM CMD Page

8.3 DATA

This page (see Figure 6) allows the user to program the 1 K-bit EPROM with desired values. It requires that the hardware is setup as described in the EPROM programming of this user's guide.

The EPROM memory map is organized in four pages of 32 bytes each. All registers can be read by clicking on the *Read Memory* button. As the registers of a specific page are being read, the page number are highlighted in red.

There are two methods of programming the EPROM using the EVSW. One is by

1. Click on a specific grid that corresponds to the register that needs to be written. Write the hex value of the data that needs to be written, and then hit ENTER.
2. The other method of programming the EPROM is by importing a data file that contains all the values to be programmed. The data file has the file extension ***.txt***. An example of a data file is included with the EVSW. To create additional data files, modify the example file so that the values on the right side of the file represent the desired values. Save the file with a different name ensuring that the extension ***.txt*** is used. To import a file into the grid, go to *File* | *Open Data File*, and select the appropriate file. Once the file is opened, the grid is filled in with the values contained in the data file. Click on the *Write Memory* button so that the values are programmed into the EPROM.

A data file can also be saved by going to *File* | *Save Data File*. The data that is saved in the file is the data displayed on the grids representing the EPROM memory map.

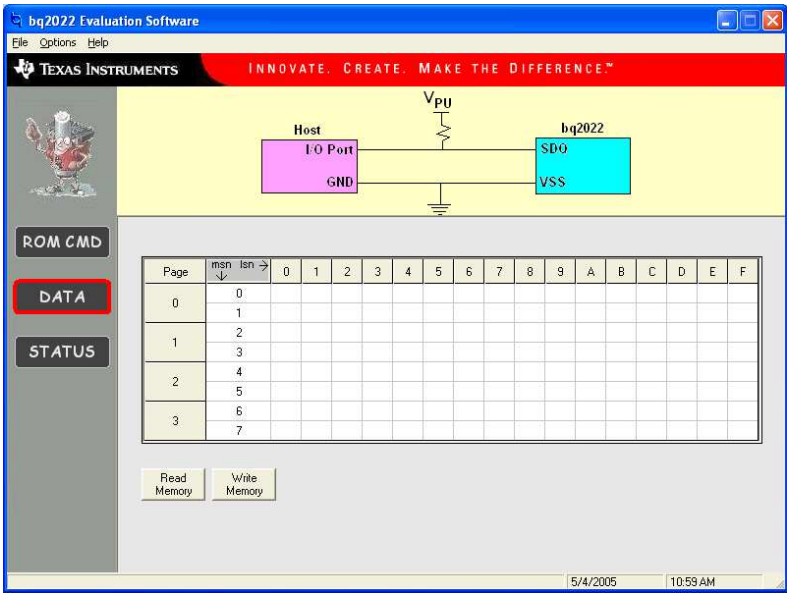

Figure 6. DATA Page

8.4 STATUS

This page (see Figure 7) allows the user to read or write the EPROM Status bytes of bq2022. The registers are programmed by clicking on the appropriate grid, entering the desired value, and pressing ENTER.

There are buttons provided for the user to select specific pages for write protection. By selecting any of the *Write Protection Bits* button, register 0x00 of status registers is written automatically so that the corresponding bit is cleared.

Note that the status registers are EPROM. Once a bit has been cleared it can not be set.

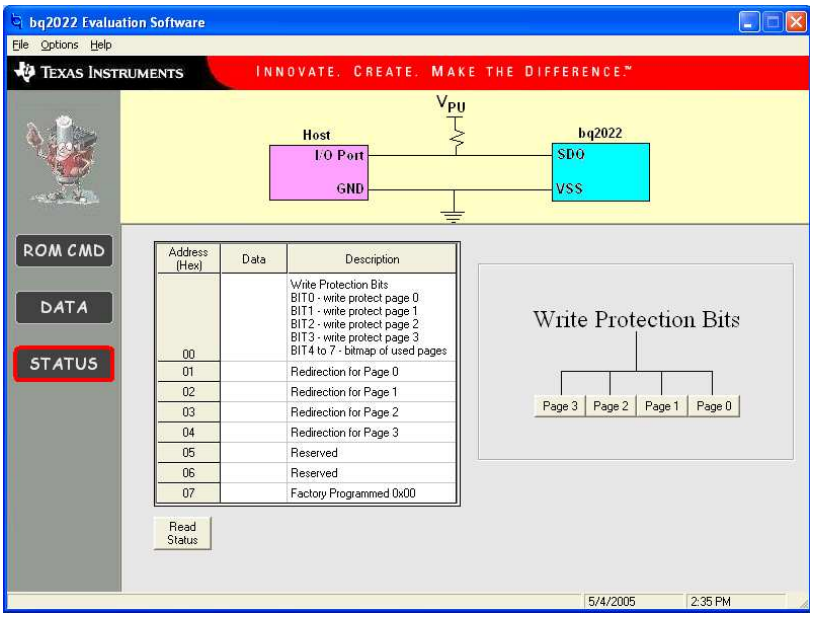

Figure 7. STATUS Page

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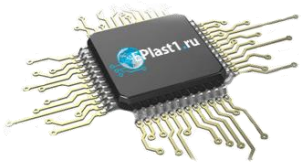

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