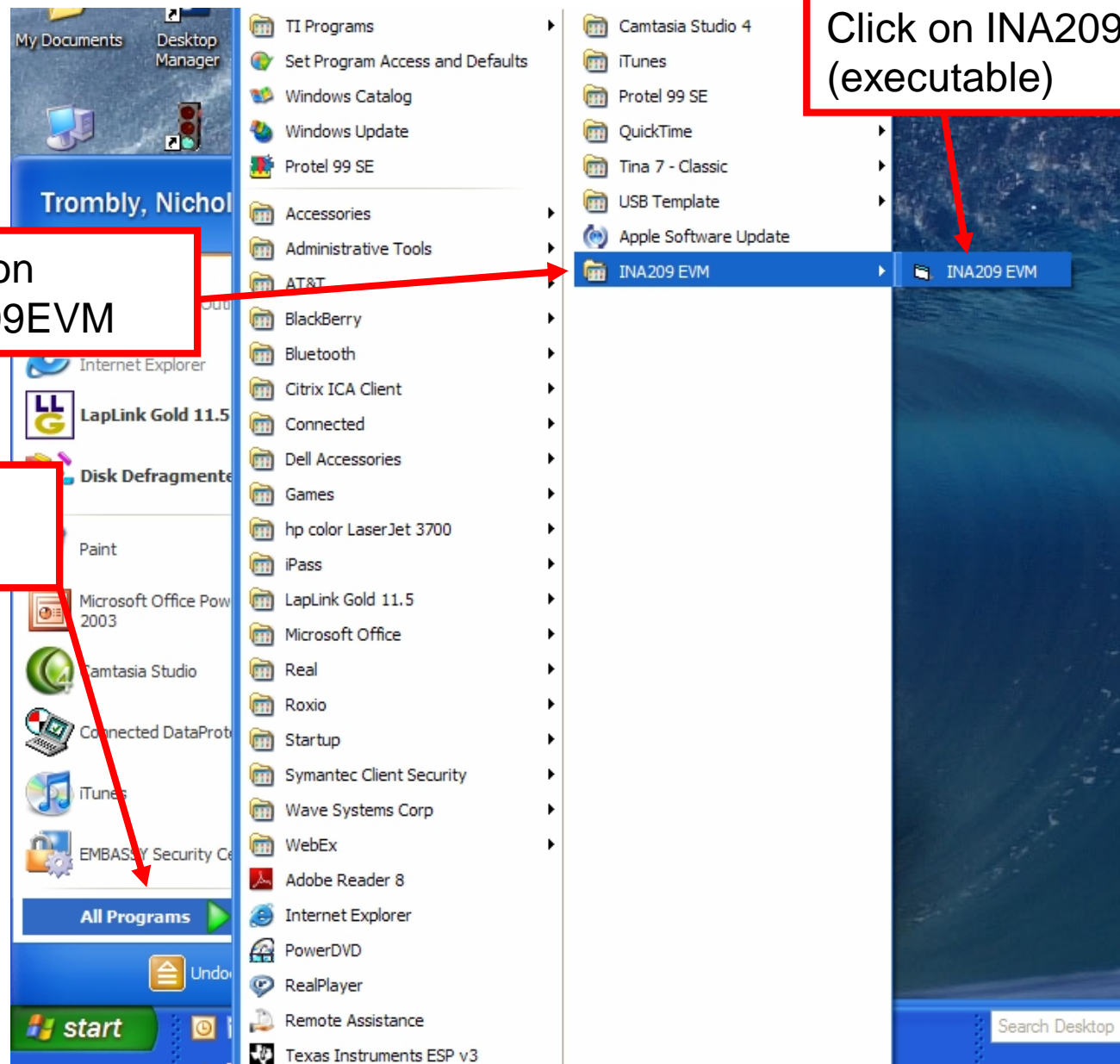
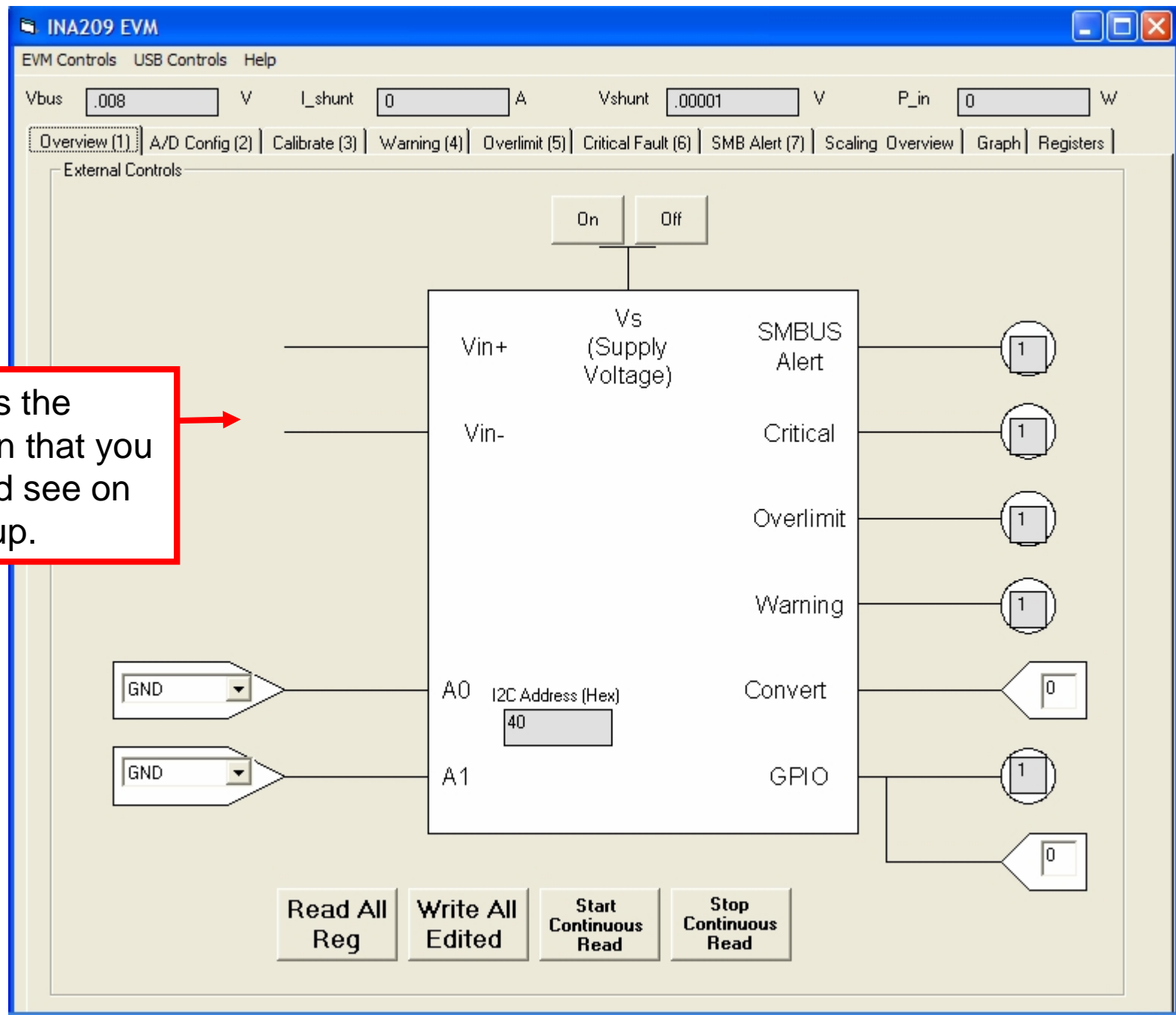


Software Overview of the INA209EVM

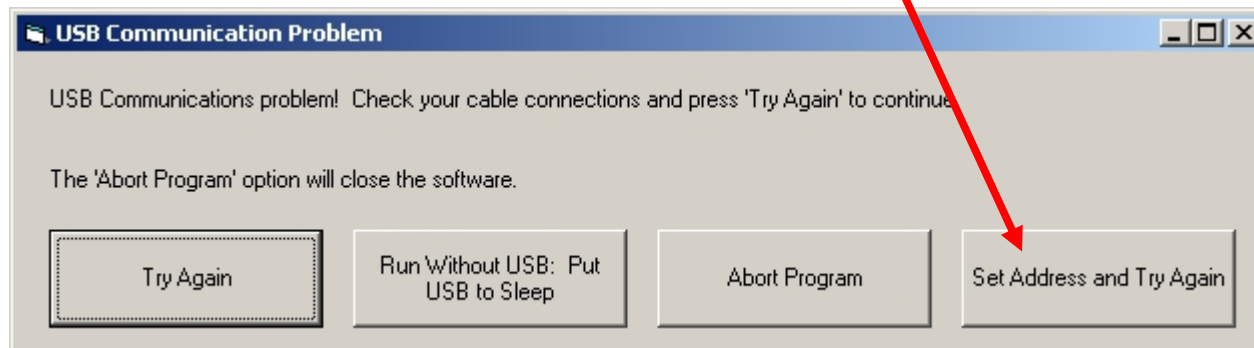




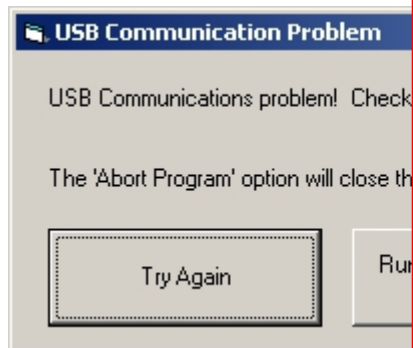
Fix for common problem.

If there is a communication problem this screen will pop-up.

The most likely issue is the wrong USB Address. Press “Set Address and Try Again”.

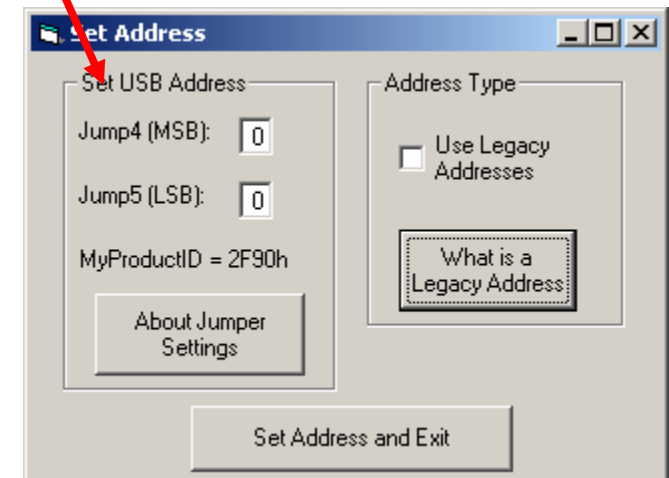
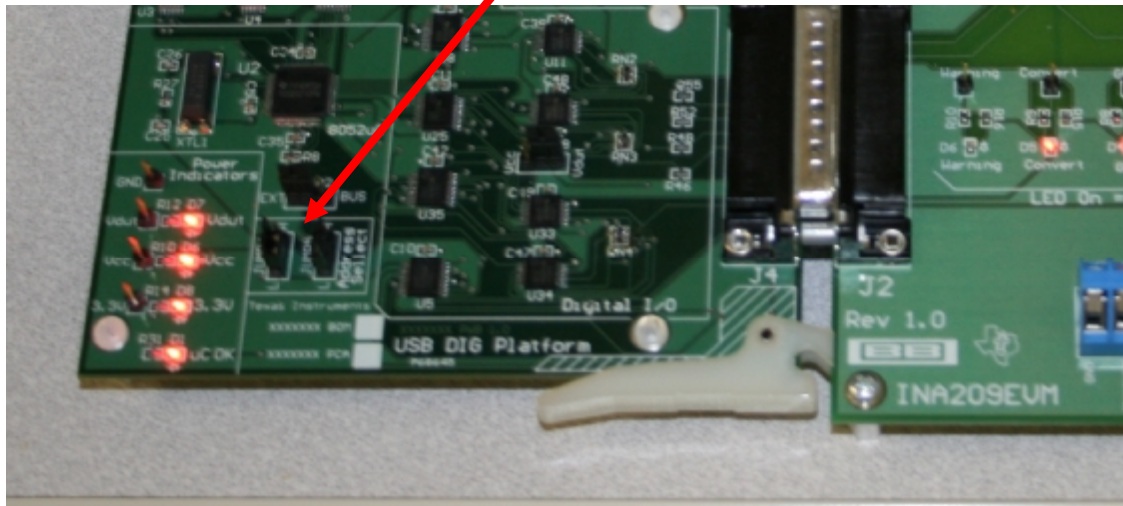


Fix for common problem.



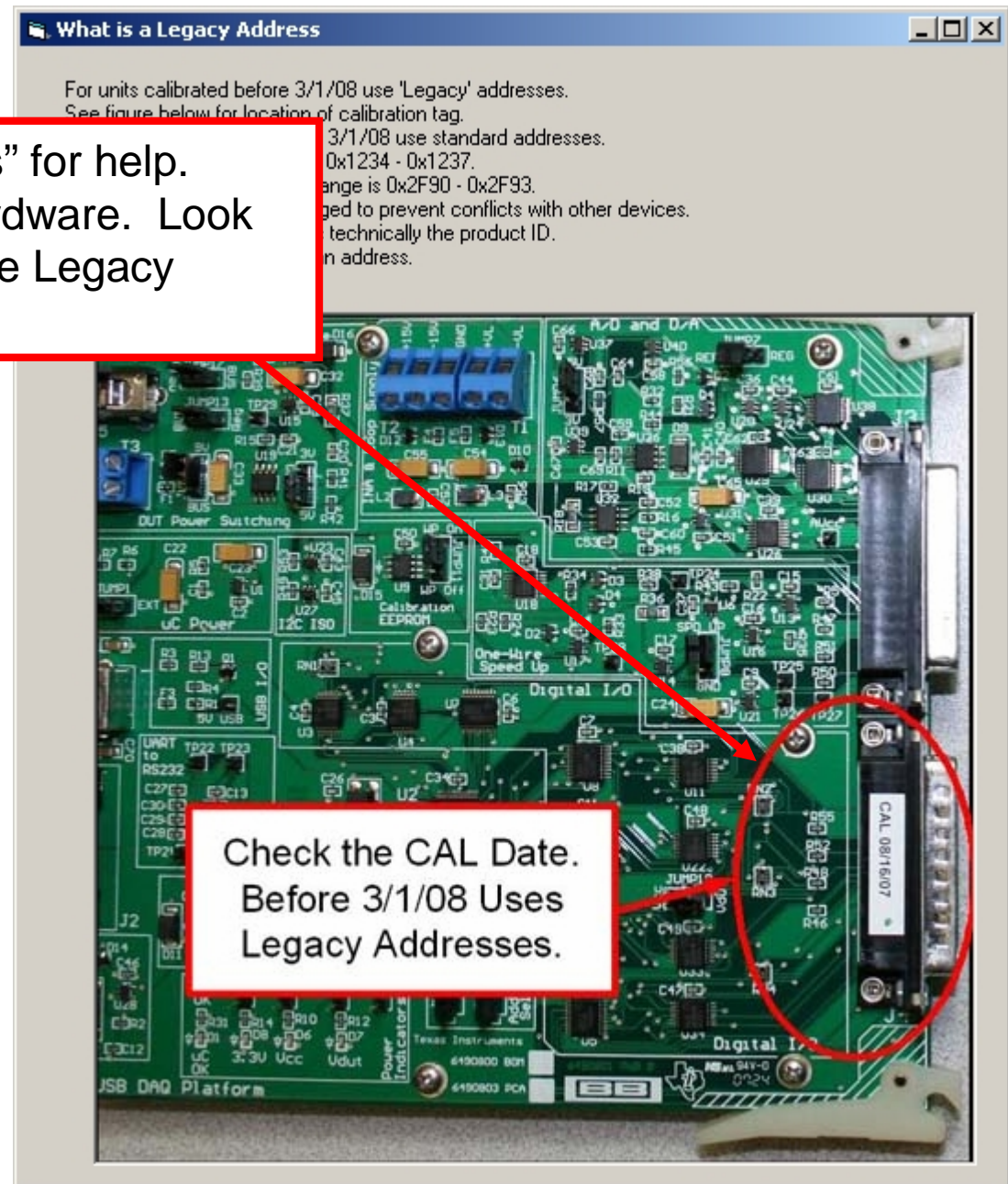
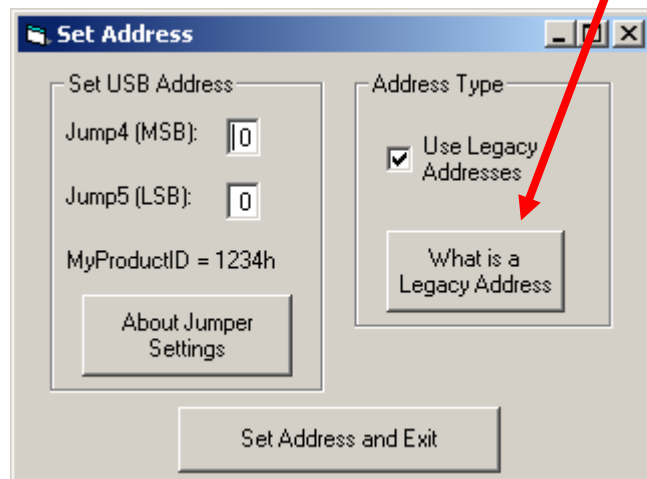
This window allows you to set the USB Address.

1. Look at the jumper settings on the USB DIG Platform. Default is Jump4 = L, Jump5 = L.
2. Set bits in window to match jumper settings. Default is Jump4=0, Jump5=0.
3. Select "Use Legacy Address" for boards calibrated before 3/1/08. (see next slide)
4. Press "Set Address and Exit"



Fix for common problem.

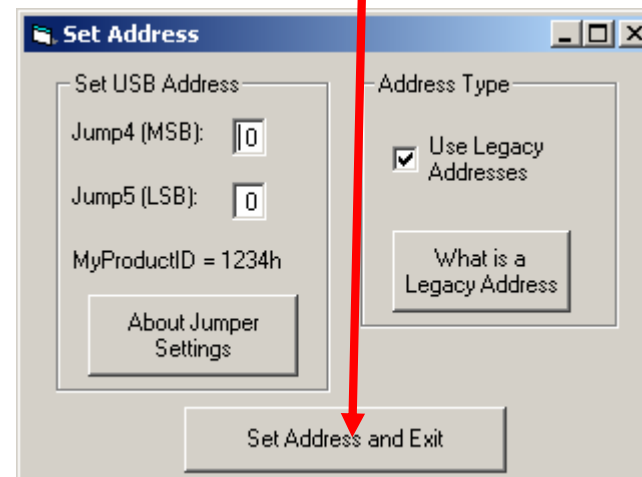
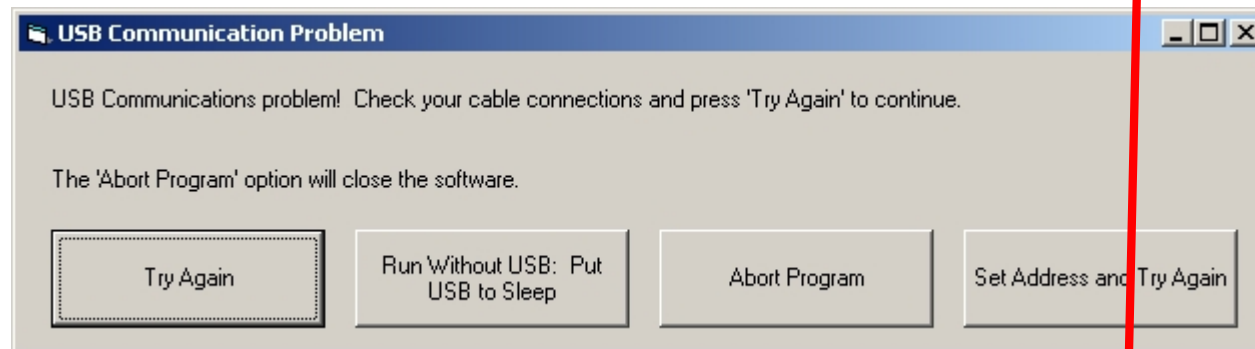
Press “What is a Legacy Address” for help.
Legacy Addresses are for old hardware. Look
at the calibration tag to see if “Use Legacy
Address” should be checked.

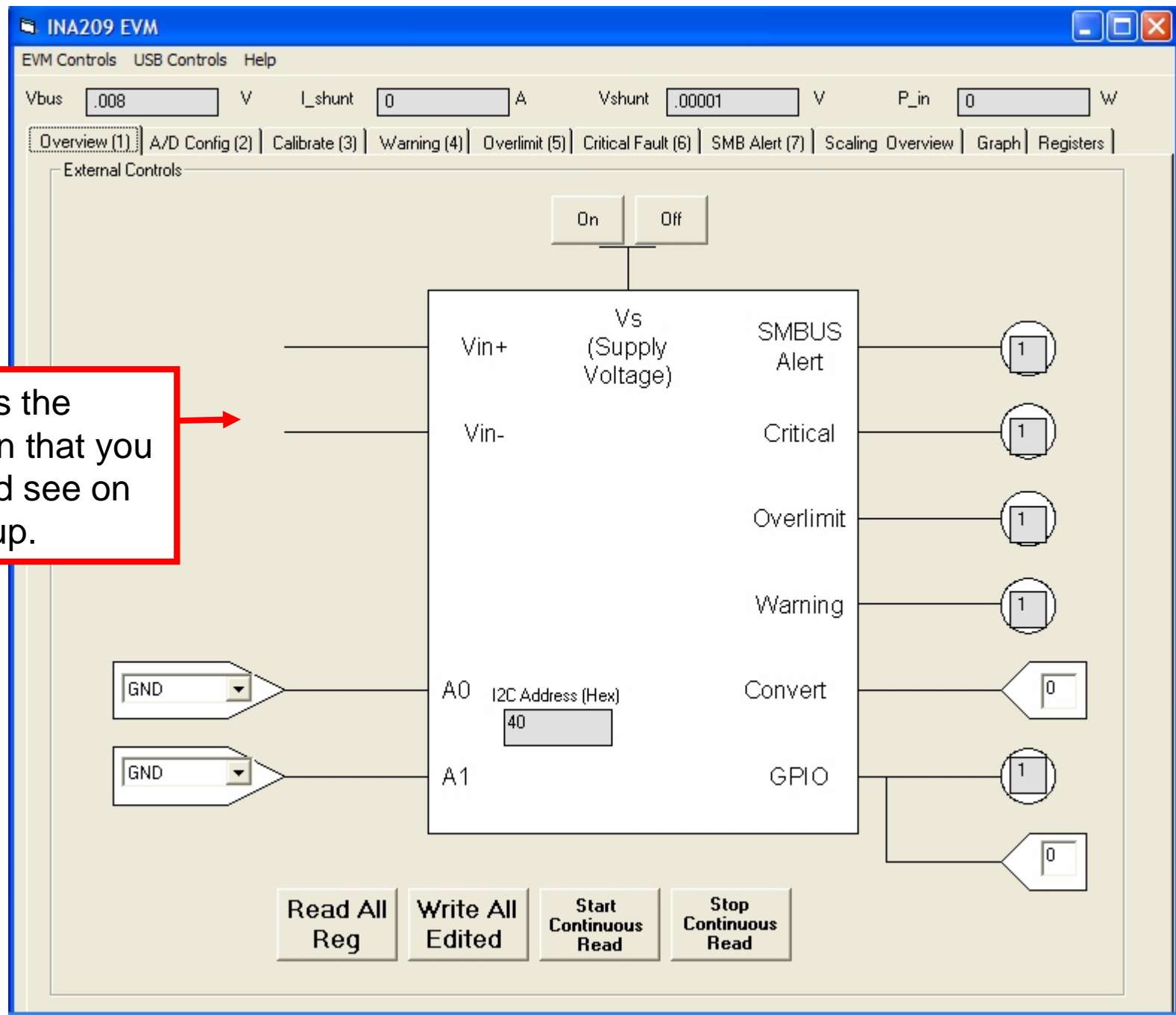


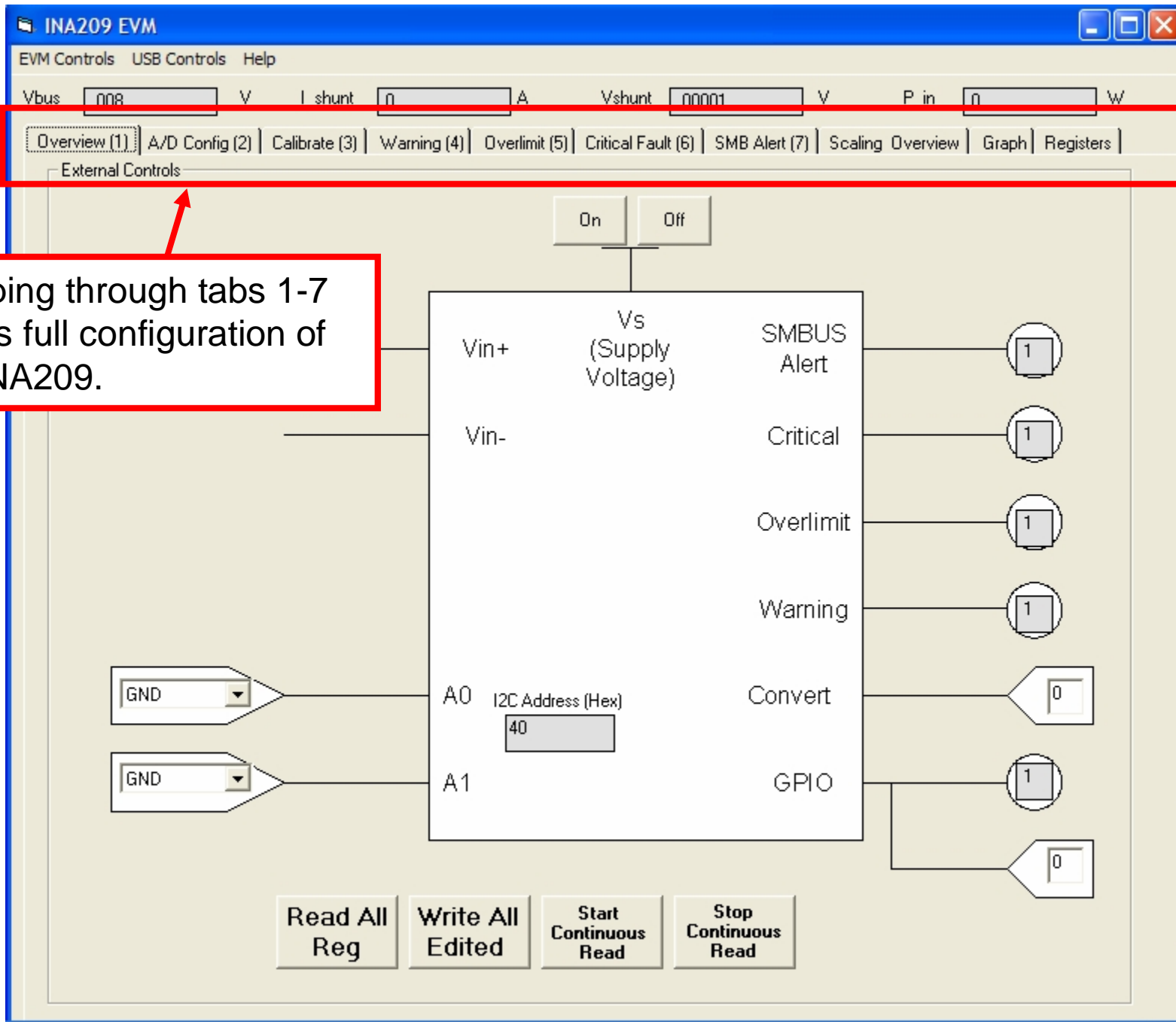
Check the CAL Date.
Before 3/1/08 Uses
Legacy Addresses.

Fix for common problem.

After the address has been changed, press “Set Address and Exit”.







Changing graphical controls on tabs 1-7 will change the corresponding bits in the registers. Changing bits in the registers will change the corresponding controls on tabs 1-7.

The screenshot displays the INA209 EVM software interface, specifically the A/D Configuration and Registers tabs. Red boxes and arrows illustrate the relationship between graphical controls and register bits.

A/D Configuration Tab:

- Shunt A/D Configuration:** A red box highlights the "10-bit, 1 avg, 148uS" dropdown menu. A red arrow points from this box to the **Register Bit Map** section, specifically to the **S_ADC4** bit.
- Bus A/D Configuration:** A red box highlights the "12-bit, 8 avg, 4.26mS" dropdown menu. A red arrow points from this box to the **Register Bit Map** section, specifically to the **S_ADC3** bit.

Registers Tab:

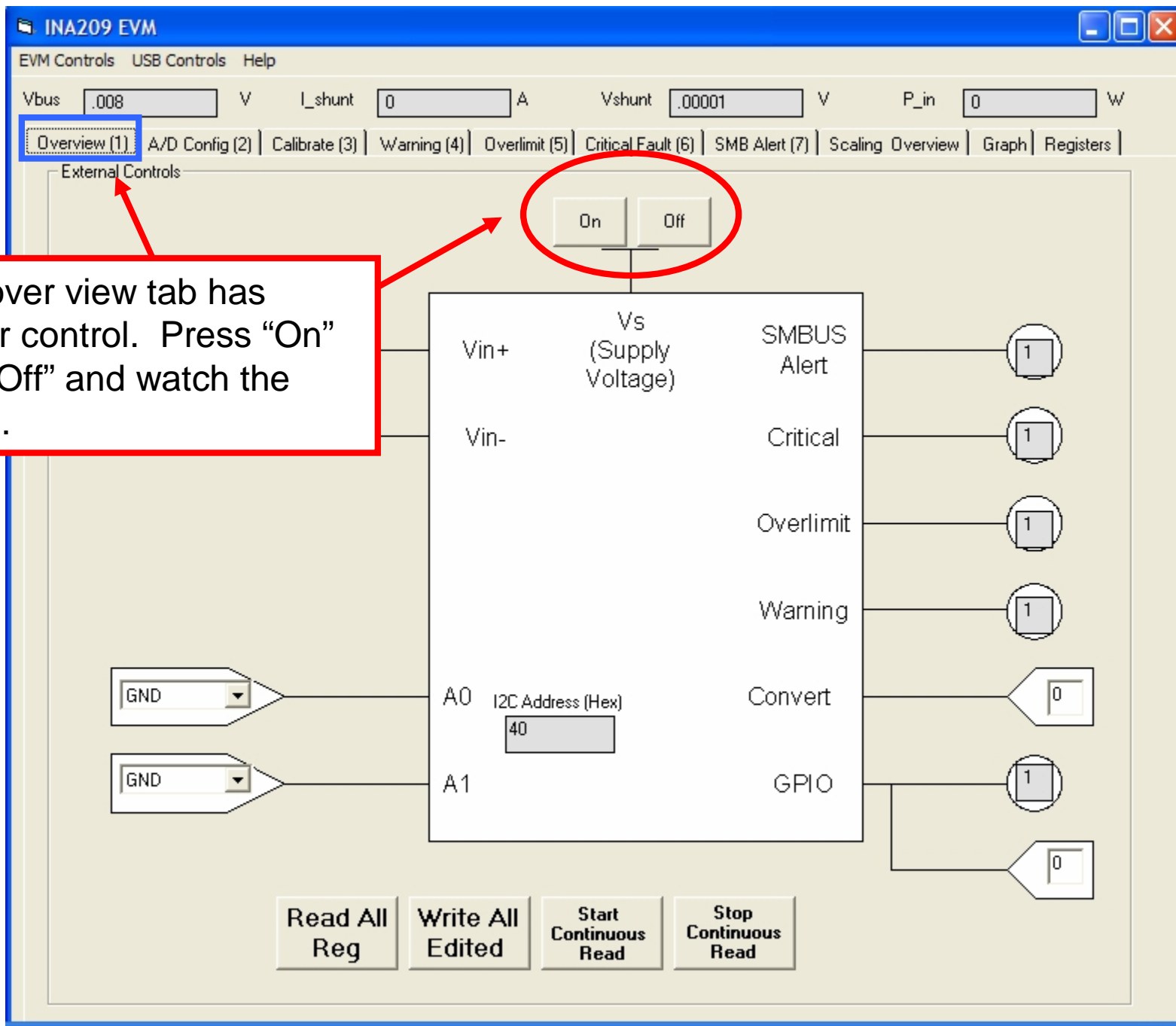
The **Registers** tab shows a table of registers. A red box highlights the **Config** register (00h) and the **Status** register (01h).

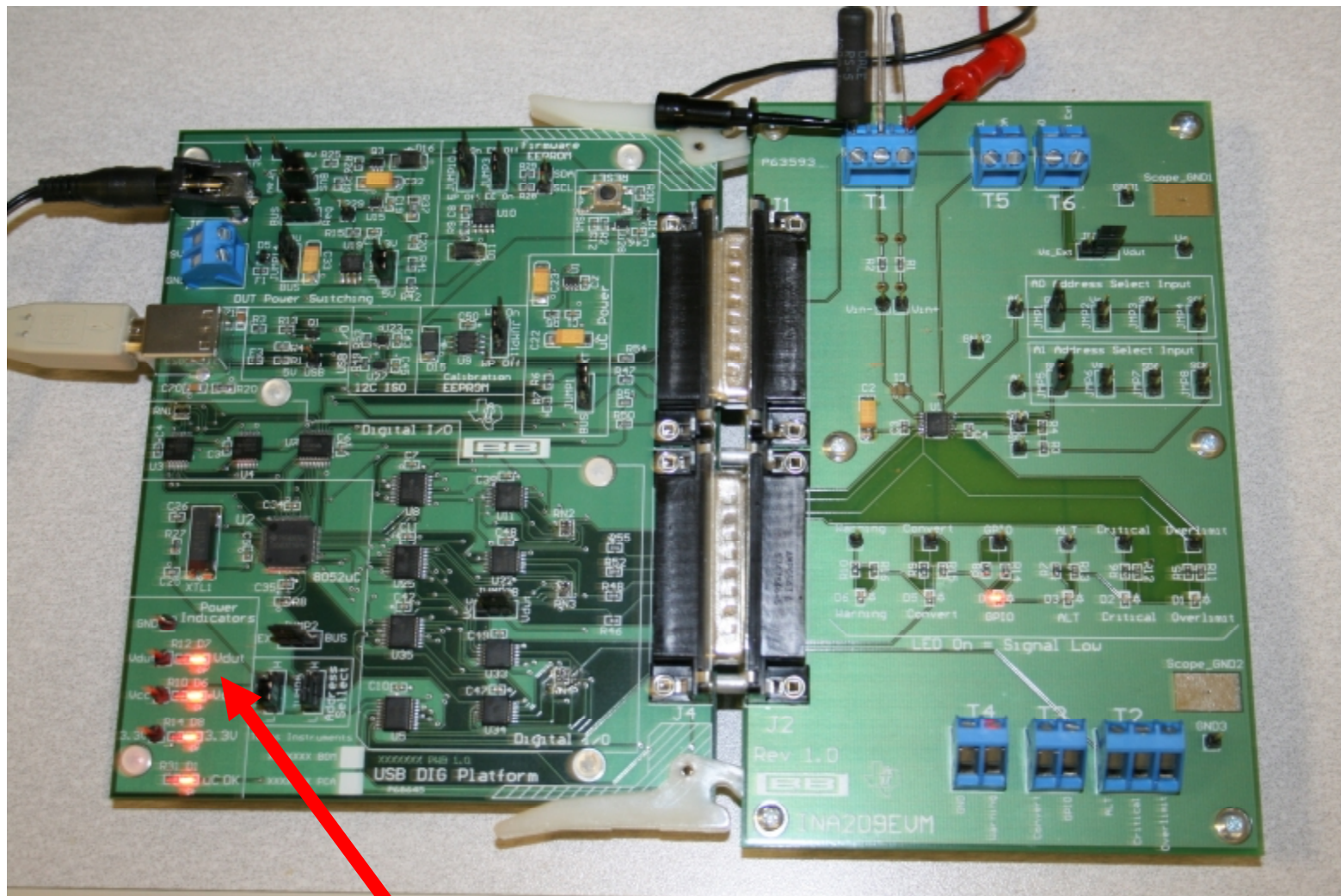
| Addr | Name | Hex | Binary | Decimal |
|------|---------------------------------------|--------|-----------------------|----------|
| 00h | Config | 0x3D8F | 0x0011_1101_1000_1111 | |
| 01h | Status | 0xB5A0 | 0x1011_0101_1010_0000 | |
| 02h | Shunt vs. Alert Mask / Enable Control | 0x0000 | 0x0000_0000_0000_0000 | |
| 03h | Shunt Voltage | 0x0065 | 0x0000_0000_0101_0101 | 0.00065 |
| 04h | Bus Voltage | 0x7A58 | 0x0111_1010_0101_1000 | 15.66 |
| 05h | Power | 0x00A7 | 0x0000_0000_1010_0111 | 6.69 |
| 06h | Current / PGA | 0x00CB | 0x0000_0000_1100_1011 | 0.406 |
| 07h | Shunt + Peak | 0x0090 | 0x0000_0000_0101_1101 | 0.00093 |
| 08h | Shunt - Peak | 0x7FFC | 0x1111_1111_1111_1100 | -0.00004 |
| 09h | Bus V Max Peak | 0x7A58 | 0x0111_1010_1000_1000 | 15.694 |
| 0Ah | Bus V Low Peak | 0x498 | 0x0000_0100_1001_1000 | 0.568 |
| 0Bh | Power Peak | 0x00C6 | 0x0000_0000_1100_0110 | 7.52 |
| 0Ch | Shunt +Warning | 0x0000 | 0x0000_0000_0000_0000 | 0 |
| 0Dh | Shunt -Warning | 0x0000 | 0x0000_0000_0000_0000 | 0 |
| 0Eh | Power Warning | 0x0000 | 0x0000_0000_0000_0000 | 0 |
| 0Fh | Bus Over Voltage Warning | 0x0000 | 0x0000_0000_0000_0000 | 0 |
| 10h | Bus Under Voltage Warning | 0x0000 | 0x0000_0000_0000_0000 | 0 |
| 11h | Power Overlimit | 0x0000 | 0x0000_0000_0000_0000 | 0 |
| 12h | Bus Over Voltage Overlimit | 0x0000 | 0x0000_0000_0000_0000 | 0 |
| 13h | Bus Under Voltage Overlimit | 0x0000 | 0x0000_0000_0000_0000 | 0 |
| 14h | Critical DAC+ | 0x0000 | 0x0000_0000_0000_0000 | 0 |
| 15h | Critical DAC- | 0x0000 | 0x0000_0000_0000_0000 | 0 |
| 16h | Full Scale Cal | 0x2800 | 0x0010_1000_0000_0000 | |

Register Bit Map:

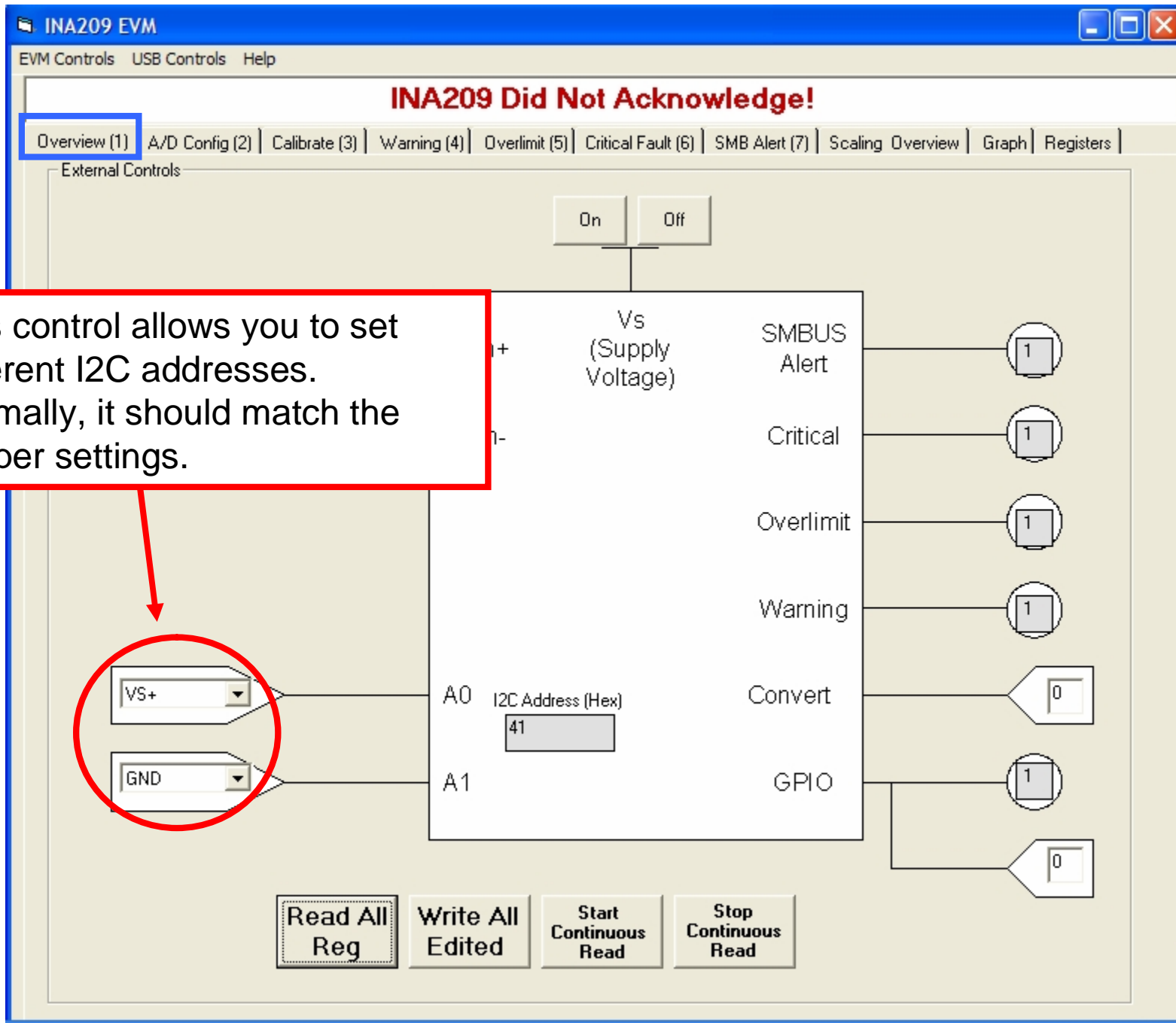
The **Register Bit Map** section shows the bit values for the **Config** register (00h). A red box highlights the **S_ADC4** bit, which is set to 1.

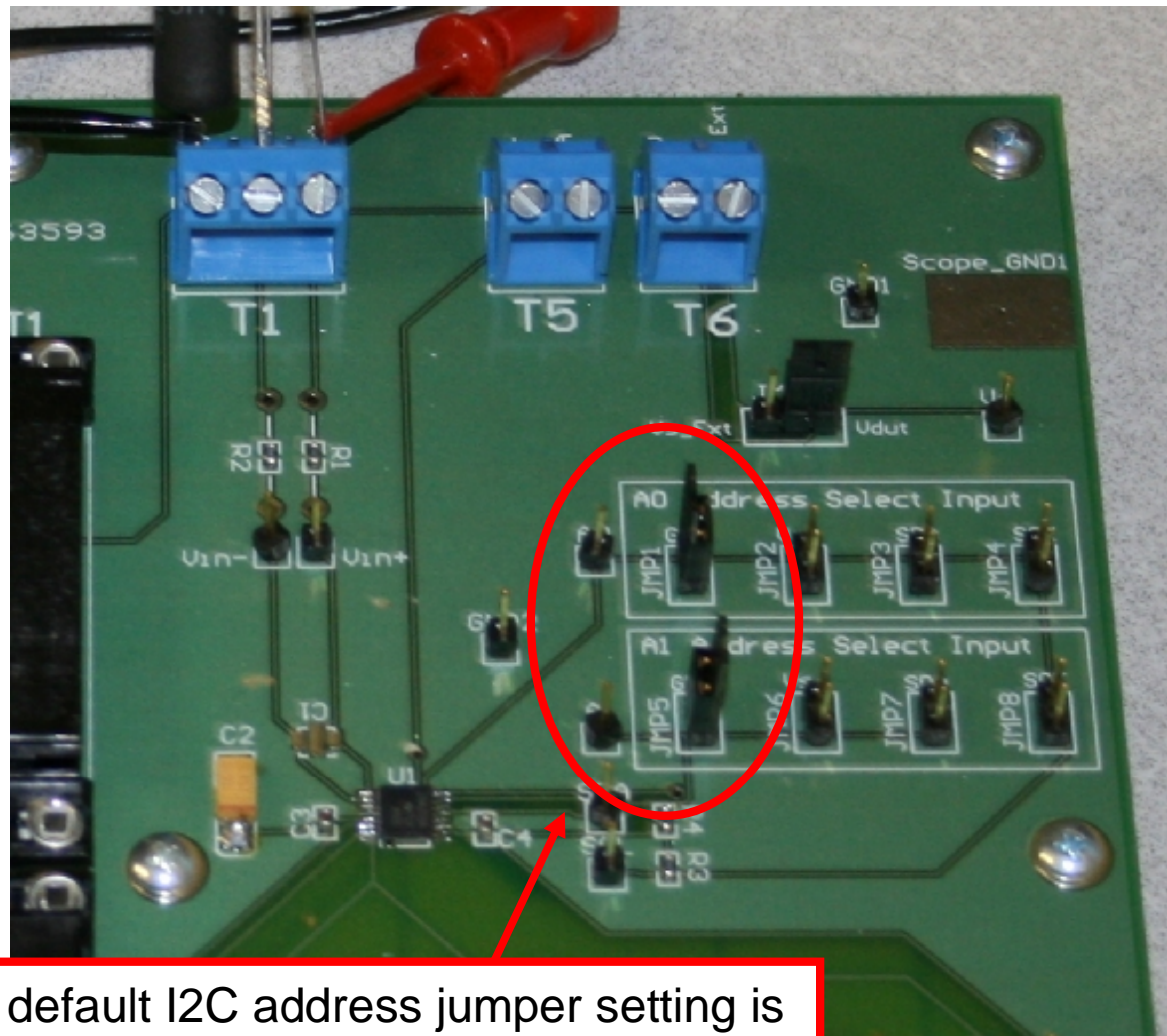
| Bit | Value |
|--------|-------|
| D14 | 0 |
| BPFG | 1 |
| PG1 | 1 |
| PG0 | 1 |
| B_ADC4 | 1 |
| B_ADC3 | 0 |
| B_ADC2 | 1 |
| B_ADC1 | 1 |
| S_ADC4 | 1 |
| S_ADC3 | 0 |
| S_ADC2 | 0 |
| S_ADC1 | 1 |
| MODE3 | 1 |
| MODE2 | 1 |
| MODE1 | 1 |



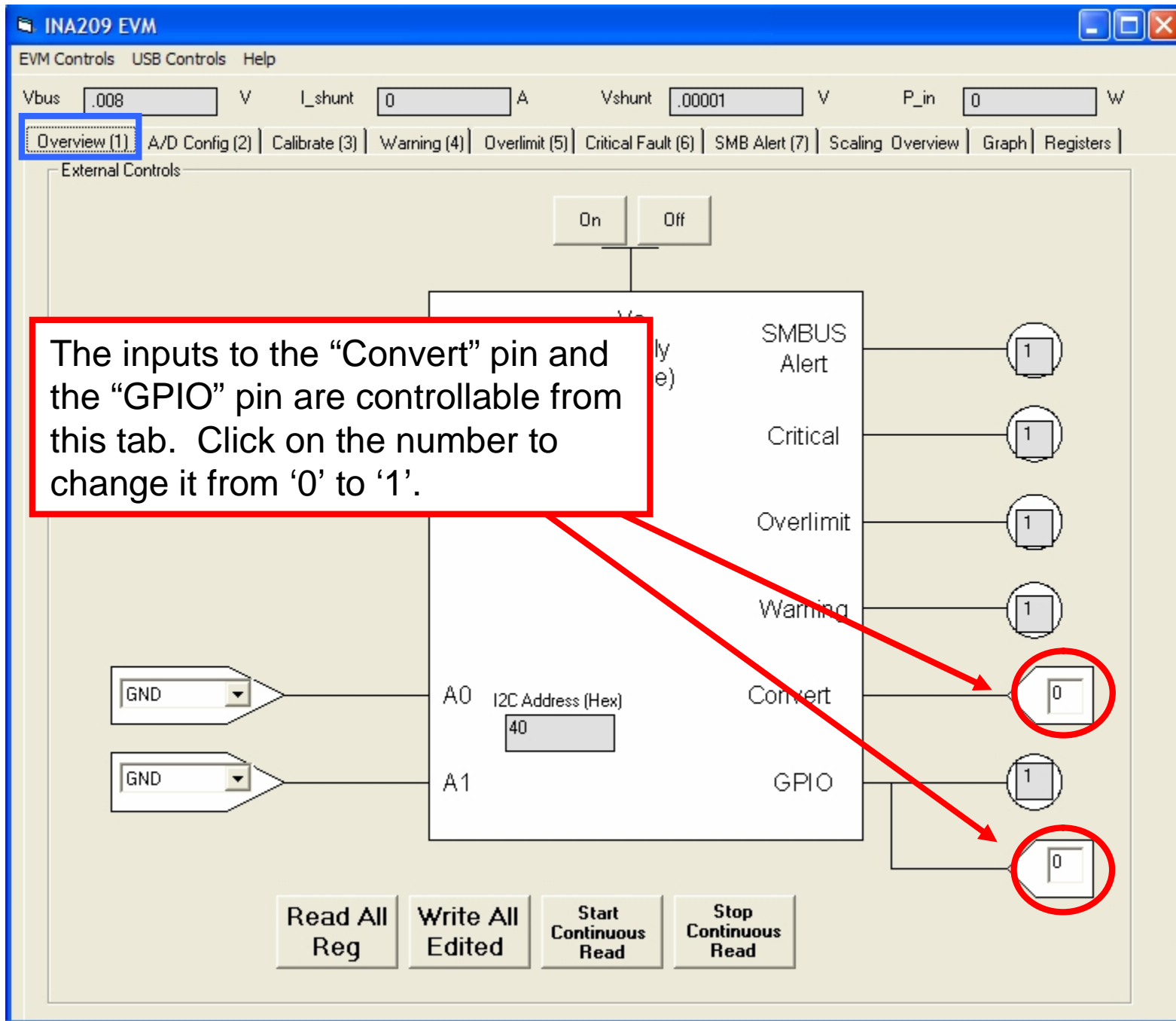


Vdut LED will light

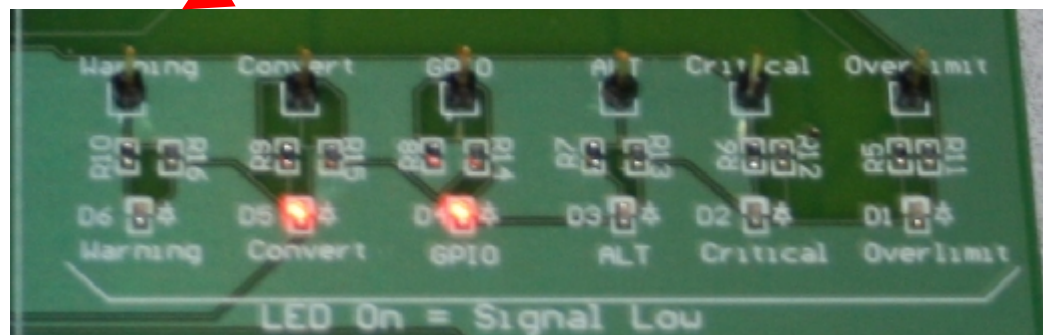
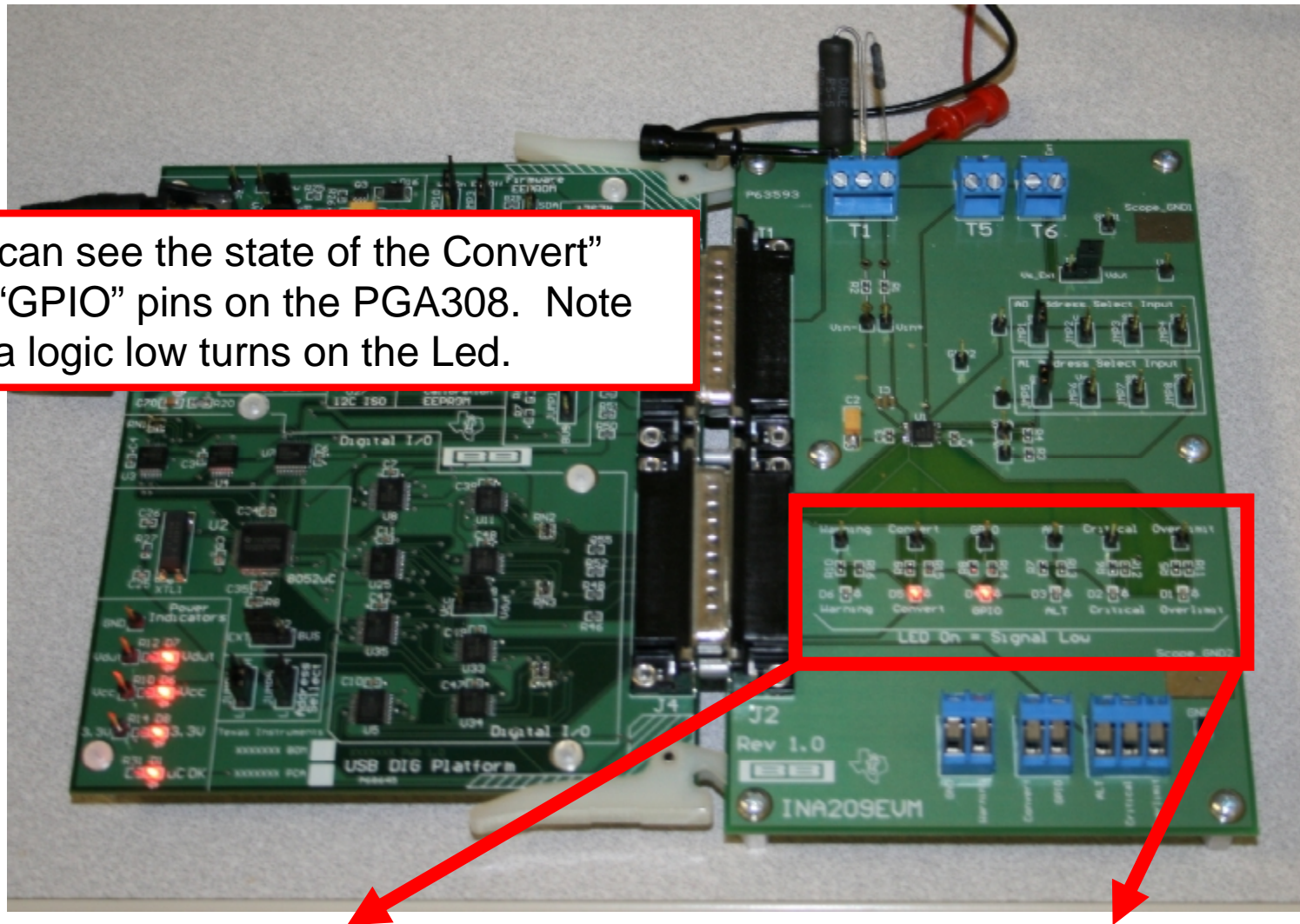




The default I2C address jumper setting is
A0 = GND, A1=GND.



You can see the state of the “Convert” and “GPIO” pins on the PGA308. Note that a logic low turns on the Led.



INA209 EVM

EVM Controls USB Controls Help

Vbus 0 V I_shunt 0 A Vst

Overview (1) **A/D Config (2)** Calibrate (3) Warning (4) Overlimit (5) Status (6)

A/D Configuration

Shunt Voltage Attenuator

div 1 (40mV max)

Shunt A/D Configuration

9-bit, 1 avg, 84uS

Bus Voltage Attenuator

16V FSR

Bus A/D Configuration

9-bit, 1 avg, 84uS

A/D Converter Mode

Power Down

Shunt Voltage

0

Bus Voltage

0

Read All Reg Write all Edited Start Continuous Read Stop Continuous Read

The "A/D Config" tab allows full configuration of the A/D converter.

INA209 EVM

EVM Controls USB Controls Help

Vbus 0 V I_shunt 0 A Vshunt 0 V P_in 0 W

Overview (1) A/D Config (2) Calibrate (3) Warning (4) Overlimit (5) Critical Fault (6) SMB Alert (7) Scaling Overview Graph Registers

A/D Configuration

Shunt Voltage Attenuator

Shunt A/D Configuration

div 1 (40mV max)
div 1 (40mV max)
div 2 (80mV max)
div 4 (160mV max)
div 8 (320mV max)

8-bit, 1 avg. 84uS

Bus Voltage Attenuator

Bus A/D Configuration

16V FSR

9-bit, 1 avg. 84uS

A/D Converter Mode

Power Down

Shunt Voltage 0

Bus Voltage 0

Read All Reg Write all Edited Start Continuous Read Stop Continuous Read

The "Shunt Voltage" input has four different ranges.

INA209 EVM

EVM Controls USB Controls Help

Vbus 0 V I_shunt 0 A Vshunt 0 V P_in 0 W

Overview (1) A/D Config (2) Calibrate (3) Warning (4) Overlimit (5) Critical Fault (6) SMB Alert (7) Scaling Overview Graph Registers

A/D Configuration

Shunt Voltage Attenuator

div 8 (320mV ma)

Shunt A/D Configuration

9-bit, 1 avg, 84uS
9-bit, 1 avg, 84uS
10-bit, 1 avg, 148uS
11-bit, 1 avg, 276uS
12-bit, 1 avg, 532uS
12-bit, 1 avg, 532uS
12-bit, 2 avg, 1.06mS
12-bit, 4 avg, 2.13mS
12-bit, 8 avg, 4.26mS

Bus Voltage Attenuator

16V FSR

Bus A/D Configuration

12-bit, 1 avg, 532uS

A/D Converter Mode

Power Down

Shunt Voltage

0

Bus Voltage

0

Read All Reg Write all Edited Start Continuous Read Stop Continuous Read

The "Shunt Voltage" gets it's own A/D resolution and averaging configuration.

INA209 EVM

EVM Controls USB Controls Help

Vbus 0 V I_shunt 0 A Vshunt 0 V P_in 0 W

Overview (1) A/D Config (2) Calibrate (3) Warning (4) Overlimit (5) Critical Fault (6) SMB Alert (7) Scaling Overview Graph Registers

A/D Configuration

Shunt Voltage Attenuator

Shunt A/D Configuration

div 8 (320mV ma)

12-bit

Bus Voltage Attenuator

Bus A/D Configuration

16V FSR

16V FSR

32V FSR

12-bit, 1 avg, 532uS

Shunt Voltage

0

Bus Voltage

0

Read All Reg Write all Edited Start Continuous Read Stop Continuous Read

The "Bus Voltage" input has two different ranges.

INA209 EVM

EVM Controls USB Controls Help

Vbus 0 V I_shunt 0 A Vshunt 0 V P_in 0 W

Overview (1) **A/D Config (2)** Calibrate (3) Warning (4) Overlimit (5) Critical Fault (6) SMB Alert (7) Scaling Overview Graph Registers

A/D Configuration

Shunt Voltage Attenuator

Shunt A/D Configuration

div 8 (320mV ma)

12-bit

Bus Voltage Attenuator

Bus A/D Configuration

16V FSR

16V FSR

32V FSR

12-bit, 1 avg, 532uS

Shunt Voltage

0

Bus Voltage

0

Read All Reg

Write all Edited

Start Continuous Read

Stop Continuous Read

The "Bus Voltage" has it's own configuration.

INA209 EVM

EVM Controls USB Controls Help

Vbus 0 V I_shunt 0 A Vshunt 0 V P_in 0 W

Overview (1) A/D Config (2) Calibrate (3) Warning (4) Overlimit (5) Critical Fault (6) SMB Alert (7) Scaling Overview Graph Registers

A/D Configuration

Shunt Voltage Attenuator

div 8 (320mV ma)

12-bit, 1 avg, 532uS

Bus Voltage Attenuator

32V FSR

Bus A/D Configuration

12-bit, 1 avg, 532uS

A/D Converter Mode

- Power Down
- Shunt Voltage, Triggered
- Bus Voltage, Triggered
- Shunt & Bus Voltage, Triggered
- ADC off (Disable)
- Shunt Voltage, Continuous
- Bus Voltage, Continuous
- Shunt & Bus Voltage, Continuous

Shunt Voltage 0

Bus Voltage 0

Read All Reg Write all Edited Start Continuous Read Stop Continuous Read

There are many different modes of A/D operation. Most applications use the "Shunt & Bus Voltage, Continuous" mode.

INA209 EVM

EVM Controls USB Controls Help

Vbus 0 V I_shunt 0 A Vshunt 0 V P_in 0 W

Overview (1) A/D Config (2) Calibrate (3) Warning (4) Overlimit (5) Critical Fault (6) SMB Alert (7) Scaling Overview Graph Registers

A/D Configuration

Shunt Voltage Attenuator

div 8 (320mV ma)

Shunt A/D Configuration

12-bit, 1 avg, 532uS

A/D Converter Mode

Shunt & Bus Voltage, Continuous

Shunt Voltage 0

Bus Voltage 0

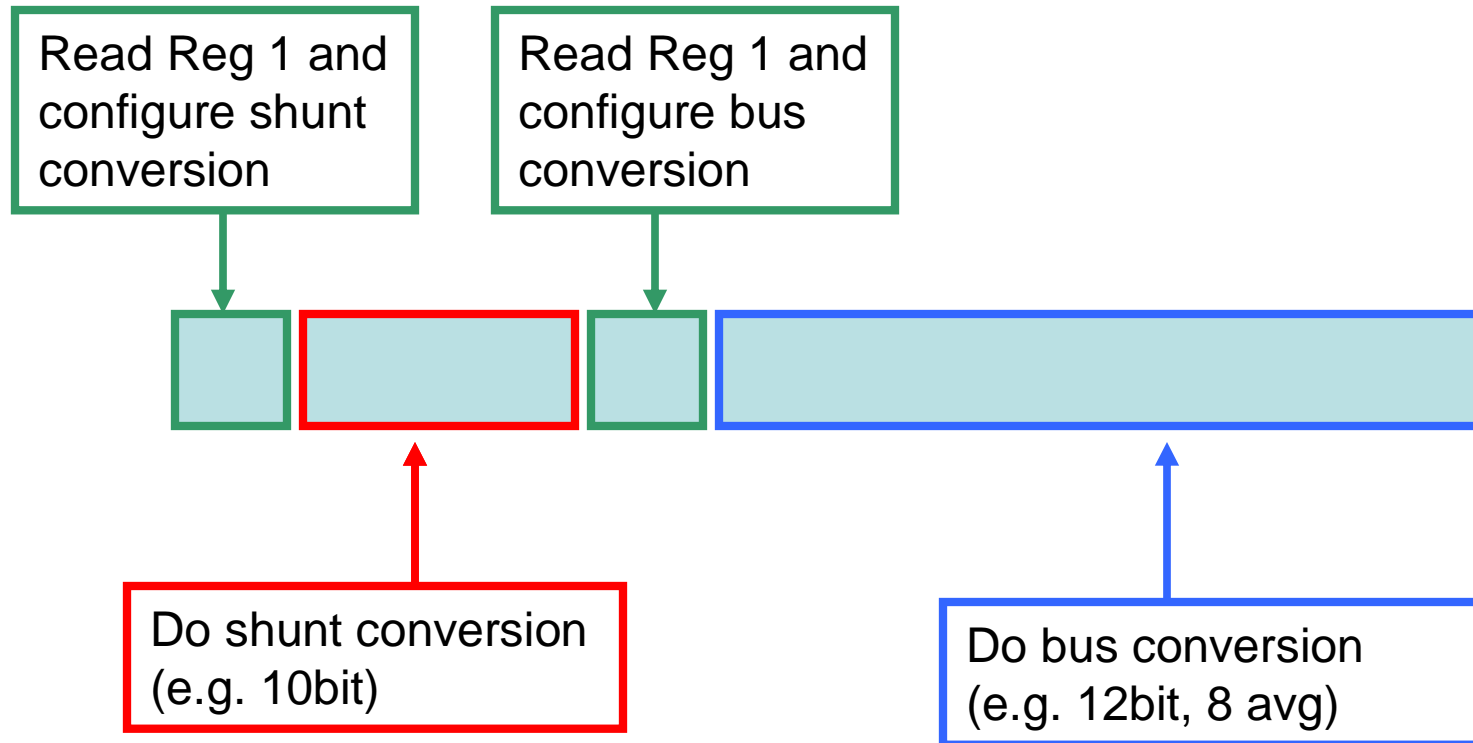
32V FSR

12-bit, avg, 532uS

Read All Reg Write all Edited Start Continuous Read Stop Continuous Read

After making changes to the A/D configuration press "Write all Edited". This will copy the changes into the INA209 registers.

How the A/D Works



INA209 EVM

EVM Controls USB Controls Help

Vbus .004 V I_shunt 0 A Vshunt .00003 V P_in 0 W

Overview (1) **A/D Config (2)** Calibrate (3) Warning (4) Overlimit (5) Critical Fault (6) SMB Alert (7) Scaling Overview Graph Registers

A/D Configuration

Shunt Voltage Attenuator

Shunt A/D Configuration

div 8 (320mV ma)

12-bit, 1 avg, 532uS

Bus Voltage Attenuator

Bus A/D Configuration

32V FSR

12-bit, 1 avg, 532uS

A/D Converter Mode

Shunt & Bus Voltage, Continuous

Shunt Voltage .00003

Bus Voltage .004

Press read to get results for the "Shunt Voltage" and "Bus Voltage".

Read All Reg Write all Edited Start Continuous Read Stop Continuous Read

INA209 EVM

EVM Controls USB Controls Help

Vbus 9.888 V I_shunt 0 A Vshunt 0.0033 V P_in 0 W

Overview (1) A/D Config (2) Calibrate (3) Warning (4) Overlimit (5) Critical Fault (6) SMB Alert (7) Scaling Overview Graph Registers

Initial Calibration (Compute Full Scale Cal Reg)

Max Bus Voltage 32 V

Max Shunt Voltage 0.32 V

Rshunt .002 Ohms

Enter Shunt Resistance

Max Possible Current A

Max Expected Current A

Enter Max Expected Current

Current LSB (12 bit Resolution) A/bit

Max Current LSB (12 bit Resolution) A/Bit

Enter Current LSB A/bit

Enter Current LSB

Calibration Reg Int Hex

Max Shunt Voltage Before Current Overflow V (Note)

Max Current Before Overflow A

Power LSB W/bit

Max Power W

Second Calibration

Read Initial Cal Current

INA209 Pre Second Cal Current

Measured Shunt Current

Compute New Full Scale Read Post Second Cal

INA209 Post Second Cal Current

New Calibration Reg Int Hex

Write all Edited Read All Reg

Prior to calibration the power value reads zero.

Enter a value for Rshunt

INA209 EVM

EVM Controls USB Controls Help

Vbus 9.888 V I_shunt 0 A Vshunt 0.0033 V P_in 0 W

Overview (1) A/D Config (2) Calibrate (3) Warning (4) Overlimit (5) Critical Fault (6) SMB Alert (7) Scaling Overview Graph Registers

Initial Calibration (Compute Full Scale Cal Reg)

Max Bus Voltage 32 V

Max Shunt Voltage 0.32 V

Rshunt 002 Ohms

Enter Shunt Resistance

Max Possible Current 160. A

Max Expected Current

Enter Max Expected Current

Enter Current LSB

Enter Current LSB

Calibration Reg Int Hex

Max Shunt Voltage Before Current Overflow V (Note)

Max Current Before Overflow A

Power LSB W/bit

Max Power W

Second Calibration

Read Initial Cal Current

INA209 Pre Second Cal Current

Measured Shunt Current

Compute New Full Scale Cal and Read Post Second Cal Current

INA209 Post Second Cal Current

New Calibration Reg Int Hex

Write all Edited Read All Reg

Press the "Enter Shunt Resistance" button.

INA209 EVM

EVM Controls USB Controls Help

Vbus 9.888 V I_shunt 0 A Vshunt 0.00332 V P_in 0 W

Overview (1) A/D Config (2) Calibrate (3) Warning (4) Overlimit (5) Critical Fault (6) SMB Alert (7) Scaling Overview Graph Registers

Initial Calibration (Compute Full Scale Cal Reg)

Max Bus Voltage 32 V

Max Shunt Voltage 0.32 V

Rshunt .002 Ohms

Enter Shunt Resistance

Max Possible Current 160 A

Max Expected Current 60 A

Enter Max Expected Current

Second Calibration

Read Initial Cal Current

INA209 Pre Second Cal Current

Measured Shunt Current

Compute New Full Scale Cal and Read Post Second Cal Current

INA209 Post Second Cal Current

New Calibration Reg Int Hex

Write all Edited Read All Reg

Calibration Reg Int Hex

Max Shunt Voltage Before Current Overflow V (Note)

Max Current Before Overflow A

Power LSB W/bit

Max Power W

Enter the maximum expected current for your system.

This must be less then "Max Possible Current".

INA209 EVM

EVM Controls USB Controls Help

Vbus V I_shunt A Vshunt V P_in W

Overview (1) A/D Config (2) **Calibrate (3)** Warning (4) Overlimit (5) Critical Fault (6) SMB Alert (7) Scaling Overview Graph Registers

Initial Calibration (Compute Full Scale Cal Reg)

Max Bus Voltage V

Max Shunt Voltage V

Rshunt Ohms

Max Possible Current A

Max Expected Current A

Min Current LSB (15 bit Resolution) A/bit

Max Current LSB (12 bit Resolution) A/Bit

Enter Current LSB A/bit

Calibration Reg

| Int | Hex |
|----------------------|----------------------|
| <input type="text"/> | <input type="text"/> |

Max Shunt Voltage Before Current Overflow V (Note)

Max Current Before Overflow A

Power LSB W/bit

Max Power W

Second Calibration

INA209 Pre Second Cal Current

Measured Shunt Current

INA209 Post Second Cal Current

New Calibration Reg

| Int | Hex |
|----------------------|----------------------|
| <input type="text"/> | <input type="text"/> |

Press "Enter Max Expected Current" to compute the resolution range below.

INA209 EVM

EVM Controls USB Controls Help

Vbus 9.888 V I_shunt 0 A Vshunt 0.0033 V P_in 0 W

Overview (1) A/D Config (2) Calibrate (3) Warning (4) Overlimit (5) Critical Fault (6) SMB Alert (7) Scaling Overview Graph Registers

Initial Calibration (Compute Full Scale Cal Reg)

Max Bus Voltage 32 V

Max Shunt Voltage 0.32 V

Rshunt .002 Ohms

Enter Shunt Resistance

Max Possible Current 160 A

Max Expected Current 60 A

Enter Max Expected Current

Min Current LSB (15 bit Resolution) 1.831m A/bit

Max Current LSB (12 bit Resolution) 14.652m A/Bit

Enter Current LSB 2m A/bit

Enter Current LSB

Second Calibration

Read Initial Cal Current

INA209 Pre Second Cal Current

Measured Shunt Current

Compute New Full Scale Cal and Read Post Second Cal Current

INA209 Post Second Cal Current

New Calibration Reg Int Hex

Write all Edited Read All Reg

Calibration Reg Int Hex

Max Shunt Voltage Before Current Overflow V (Note)

Max Current Before Overflow A

Power LSB W/bit

Max Power W

Enter Current LSB.

Choose a value close to "Min Current LSB" for best resolution.

INA209 EVM

EVM Controls USB Controls Help

Vbus 9.888 V I_shunt 1.656 A Vshunt 0.0033 V P_in 16.44 W

Overview (1) A/D Config (2) **Calibrate (3)** Warning (4) Overlimit (5) Critical Fault (6) SMB Alert (7) Scaling Overview Graph Registers

Initial Calibration (Compute Full Scale Cal Reg)

Max Bus Voltage 32 V

Max Shunt Voltage 0.32 V

Rshunt .002 Ohms

Enter Shunt Resistance

Max Possible Current 160. A

Max Expected Current 60 A

Enter Max Expected Current

Min Current LSB (15 bit Resolution) 1.831m A/bit

Max Current LSB (12 bit Resolution) 14.652m A/Bit

Enter Current LSB 2m A/bit

Enter Current LSB

Second Calibration

Read Initial Cal Current

INA209 Pre Second Cal Current

Measured Shunt Current

Compute New Full Scale Cal and Read Post Second Cal Current

INA209 Post Second Cal Current

Int Hex

New Calibration Reg

Calibration Reg Int Hex

Max Shunt Voltage Before Current Overflow 0.131068 V (Overflow Possible)

Max Current Before Overflow 65.534 A 7FFF

Power LSB 40.000m W/bit

Max Power 2.097K W

Press Enter Current LSB.

This will compute the values below.

At this point the INA209 is calibrated.
The second calibration is optional.

INA209 EVM

EVM Controls USB Controls Help

Vbus V I_shunt A Vshunt V P_in W

Overview (1) A/D Config (2) **Calibrate (3)** Warning (4) Overlimit (5) Critical Fault (6) SMB Alert (7) Scaling Overview Graph Registers

Initial Calibration (Compute Full Scale Cal Reg)

Max Bus Voltage V

Max Shunt Voltage V

Rshunt Ohms

Max Possible Current A

Max Expected Current A

Min Current LSB (15 bit Resolution) A/bit

Max Current LSB (12 bit Resolution) A/Bit

Enter Current LSB A/bit

Calibration Reg

| | Int | Hex |
|-----------------|------------------------------------|-----------------------------------|
| Calibration Reg | <input type="text" value="10240"/> | <input type="text" value="2800"/> |

Max Shunt Voltage Before Current Overflow V (Overflow Possible)

Max Current Before Overflow A

Power LSB W/bit

Max Power W

Second Calibration

INA209 Pre Second Cal Current

Measured Shunt Current

INA209 Post Second Cal Current

New Calibration Reg

| | Int | Hex |
|---------------------|----------------------|----------------------|
| New Calibration Reg | <input type="text"/> | <input type="text"/> |

The goal of the calibration was to compute the "Current LSB" and the "Calibration Reg".

INA209 EVM

EVM Controls USB Controls Help

Vbus 9.892 V I_shunt 1.646 A Vshunt 0.00331 V P_in 16.52 W

Overview (1) A/D Config (2) Calibrate (3) Warning (4) Overlimit (5) Critical Fault (6) SMB Alert (7) Scaling Overview Graph Registers

Initial Calibration (Compute Full Scale Cal Reg)

Max Bus Voltage 32 V

Max Shunt Voltage 0.32 V

Rshunt .002 Ohms

Enter Shunt Resistance

Max Possible Current 160. A

Max Expected Current 60 A

Enter Max Expected Current

Second Calibration

Read Initial Cal Current

INA209 Pre Second Cal Current

Measured Shunt Current

Compute New Full Scale Cal and Read Post Second Cal Current

INA209 Post Second Cal Current

Int Hex

New Calibration Reg

Write all Edited Read All Reg

Calibration Reg Int Hex

10240 2800

Max Shunt Voltage Before Current Overflow 0.131068 V (Overflow Possible)

Max Current Before Overflow 65.534 A 7FFF

Power LSB 40.000m W/bit

Max Power 2.097K W

A second calibration can be used to improve the accuracy. Press the "Read Initial Cal Current" to start the second calibration.

INA209 EVM

EVM Controls USB Controls Help

Vbus 8.18 V I_shunt 24.38 A Vshunt 0.04874 V P_in 199.44 W

Overview (1) A/D Config (2) Calibrate (3) Warning (4) Overlimit (5) Critical Fault (6) SMB Alert (7) Scaling Overview Graph Registers

Initial Calibration (Compute Full Scale Cal Reg)

Max Bus Voltage 32 V

Max Shunt Voltage 0.32 V

Rshunt .002 Ohms

Enter Shunt Resistance

Max Possible Current 160. A

Max Expected Current 60 A

Enter Max Expected Current

Second Calibration

Read Initial Cal Current

INA209 Pre Second Cal Current 24.38

Measured Shunt Current

Compute New Full Scale Cal and Read Post Second Cal Current

INA209 Post Second Cal Current

Calibration Reg Int Hex

Write all Edited Read All Reg

Enter Current LSB

Calibration Reg Int Hex

Max Shunt Voltage Before Current Overflow 0.131068 V (Overflow Possible)

Max Current Before Overflow 65.534 A 7FFF

Power LSB 40.000m W/bit

Max Power 2.097K W

This value (e.g. 24.38A) was measured using the initial calibration.

INA209 EVM

EVM Controls USB Controls Help

Vbus 8.18 V I_shunt 24.38 A Vshunt 0.04874 V P_in 199.44 W

Overview (1) A/D Config (2) **Calibrate (3)** Warning (4) Overlimit (5) Critical Fault (6) SMB Alert (7) Scaling Overview Graph Registers

Initial Calibration (Compute Full Scale Cal Reg)

Max Bus Voltage 32 V

Max Shunt Voltage 0.32 V

Rshunt .002 Ohms

Enter Shunt Resistance

Max Possible Current 160. A

Max Expected Current 60 A

Enter Max Expected Current

Min Current LSB 4.892

Enter Current LSB

Calibration Reg Int 10240 Hex 2800

Max Shunt Voltage Before Current Overflow 0.131068 V (Overflow Possible)

Max Current Before Overflow 65.534 A 7FFF

Power LSB 40.000m W/bit

Max Power 2.097K W

Second Calibration

Read Initial Cal Current

INA209 Pre Second Cal Current 24.38

Measured Shunt Current 23.5

Compute New Full Scale Cal and Read Post Second Cal Current

INA209 Post Second Cal Current

Int Hex

Calibration Reg

Write all Edited Read All Reg

Use an external precision ammeter to measure the shunt current.

INA209 EVM

EVM Controls USB Controls Help

Vbus V L_shunt A Vshunt V P_in W

Overview (1) A/D Config (2) **Calibrate (3)** Warning (4) Overlimit (5) Critical Fault (6) SMB Alert (7) Scaling Overview Graph Registers

Initial Calibration (Compute Full Scale Cal Reg)

Max Bus Voltage V

Max Shunt Voltage V

Rshunt Ohms

Max Possible Current A

Max Expected Current A

Min Current LSB (15 bit Resolution) A/Bit

Max Current LSB (12 bit Resolution) A/Bit

Second Calibration

INA209 Pre Second Cal Current

Measured Shunt Current

INA209 Post Second Cal Current

New Calibration Reg Int Hex

Before Overflow A

Power LSB W/bit

Max Power W

Pressing this button will adjust the Calibration register to correct for the difference between the INA209 measurement and the precision measurement.

INA209 EVM

EVM Controls USB Controls Help

Vbus 8.18 V I_shunt 23.484 A Vshunt 0.04874 V P_in 192.08 W

Overview (1) A/D Config (2) Calibrate (3) Warning (4) Overlimit (5) Critical Fault (6) SMB Alert (7) Scaling Overview Graph Registers

Initial Calibration (Compute Full Scale Cal Reg)

Max Bus Voltage 32 V

Max Shunt Voltage 0.32 V

Max Possible Current 160 A

Max Expected Current 60 A

Enter Max Expected Current

Min Current LSB (15 bit Resolution) 1.831m A/bit

Max Current LSB (12 bit Resolution) 14.652m A/Bit

Enter LSB 2m A/bit

Enter Current LSB

Calibration Reg Int 10240 Hex 2800

Max Shunt Voltage Before Current Overflow 0.131068 V (Overflow Possible)

Max Current Before Overflow 65.534 A 7FFF

Power LSB 40.000m W/bit

Max Power 2.097K W

Second Calibration

Read Initial Cal Current

INA209 Pre Second Cal Current 24.38

Measured Shunt Current 23.5

Compute New Full Scale Cal and Read Post Second Cal Current

INA209 Post Second Cal Current 23.484

New Calibration Reg Int 9870 Hex 268E

Write all Edited

Read All Reg

Note that the INA209 now reads close to the precision ammeter.

Note that the INA209 calibration register was adjusted.

INA209 EVM

EVM Controls

USB Controls

Help

Vbus

9.536

V

I_shunt

.19261

A

Vshunt

.1926

V

P_in

1.837

W

Overview (1)

A/D Config (2)

Calibrate (3)

Warning (4)

Overlimit (5)

Critical Fault (6)

SMB Alert (7)

Scaling Overview

Graph

Registers

Enter the Warning

Power Warning

0

1

Power

1.837

Vbus Over Voltage Warning

0

1

Vbus

9.536

Vbus Under Voltage Warning

0

0

Vbus

9.536

Shunt Voltage Positive Warning

0

1

Shunt Voltage

.1926

Shunt Voltage Negative Warning

0

0

Shunt Voltage

.1926

Programmable Delay

0

Polarity

Active Low

Latch Enable

☐

Output Enable

☐

Warning

1

Read All Reg

Write all Edited

Start Continuous Read

Stop Continuous Read

INA209 EVM

EVM Controls USB Controls Help

Vbus 9.54 V I_shunt .19291 A Vshunt .19293 V P_in 1.8402 W

Overview (1) | A/D Config (2) | Calibrate (3) | **Warning (4)** | Overlimit (5) | Critical Fault (6) | SMB Alert (7) | Scaling Overview | Graph | Registers

Enter the Warning

Power Warning 2 Power 1.8402

Vbus Over Voltage Warning 0 Vbus 9.54

Vbus Under Voltage Warning 0 Vbus 9.54

Shunt Voltage Positive Warning 0 Shunt Voltage .19293

Shunt Voltage Negative Warning 0 Shunt Voltage .19293

Programmable Delay 0

Polarity Active Low

☐ Latch Enable ☐ Output Enable

Warning 1

Read All Reg Write all Edited Start Continuous Read Stop Continuous Read

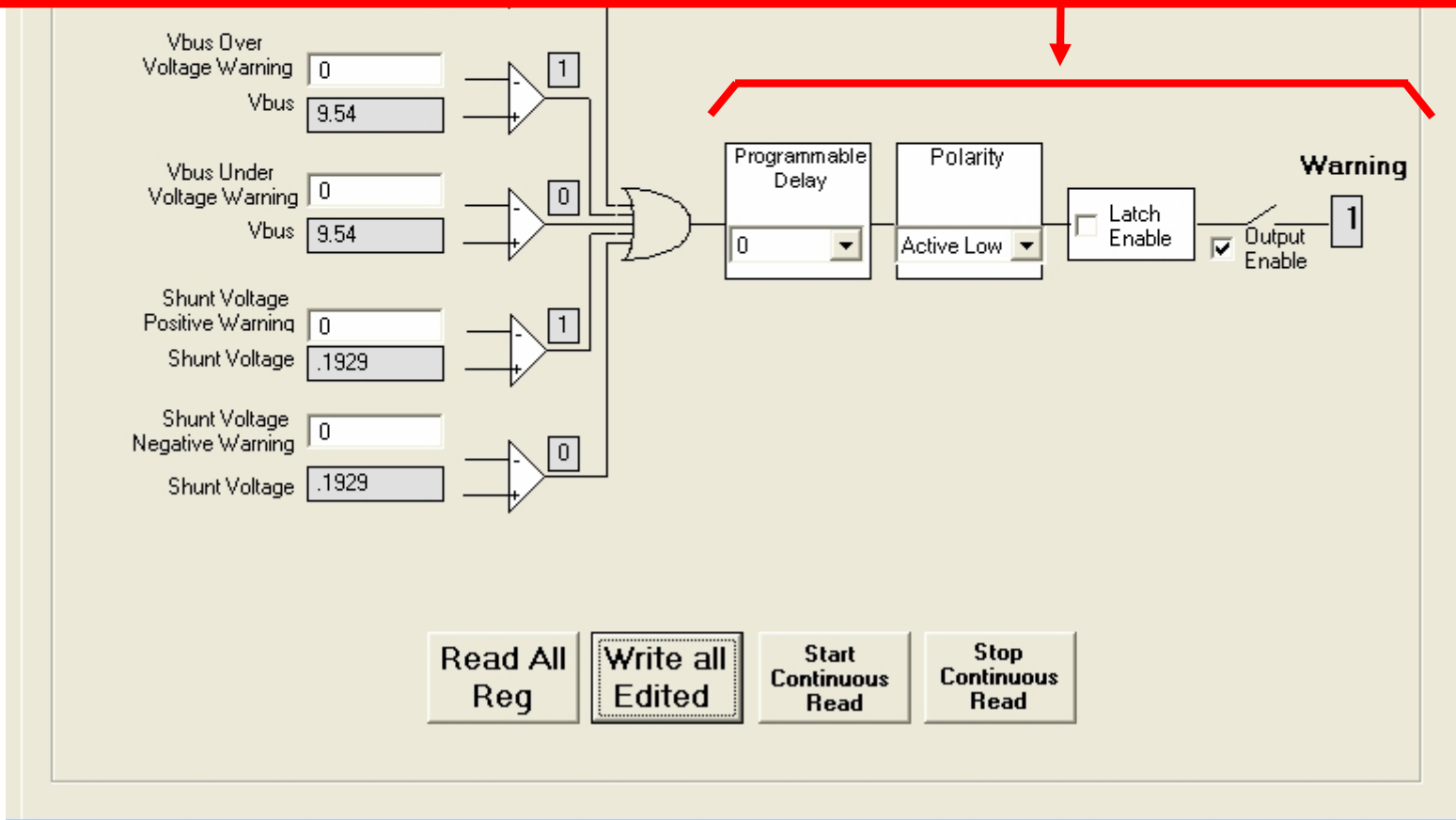
The "Warning" tab allows you to set the warning alarm trip point for power, bus voltage, and shunt voltage. If the A/D conversion result exceeds the alarm trip point, the comparator output will go high.

Programmable Delay – the “Warning” output cannot be set until after this delay. This can be used to prevent short term glitches from setting the alarm

Polarity – sets the “Warning” output as active high or low.

Latch Enable – Will force the output to stay in the alarm state until the alarm is reset. The alarm is reset by reading the INA209.

Output Enable – This allows the “Warning” pin to function. If the “Output Enable” is not checked (set to 1) the output will stay in high-z.



INA209 EVM

EVM Controls USB Controls Help

Vbus 9.54 V I_shunt .19292 A Vshunt .1929 V P_in 1.8402 W

Overview (1) | A/D Config (2) | Calibrate (3) | **Warning (4)** | Overlimit (5) | Critical Fault (6) | SMB Alert (7) | Scaling Overview | Graph | Registers

Enter the Warning

Power Warning 0
Power 1.8402
Vbus Over Voltage Warning 0
Vbus 9.54
Vbus Under Voltage Warning 0
Vbus 9.54
Shunt Voltage Positive Warning 0
Shunt Voltage .1929
Shunt Voltage Negative Warning 0
Shunt Voltage .1929

1
1
0
1
0

Programmable Delay 0
Polarity Active Low
Latch Enable
Output Enable

Warning 0

A logic low on the "Warning" pin will light the "Warning" Led.

Warning Convert GPIO ALT Critical Overlimit
D6 D5 D4 D3 D2 D1
Warning Convert GPIO ALT Critical Overlimit
LED On = Signal Low

Read All Reg Write all Edited Start Continuous Read Stop Continuous Read

INA209 EVM

EVM Controls USB Controls Help

Vbus 9.54 V I_shunt .19291 A Vshunt .19293 V P_in 1.8402 W

Overview (1) A/D Config (2) Calibrate (3) Warning (4) **Overlimit (5)** Critical Fault (6) SMB Alert (7) Scaling Overview Graph Registers

Enter the Overlimit

Power Over Limit 0
Power 1.8402

Vbus Over Voltage Limit 0
Vbus 9.54

Vbus Under Voltage Limit 0
Vbus 9.54

Over Limit 1

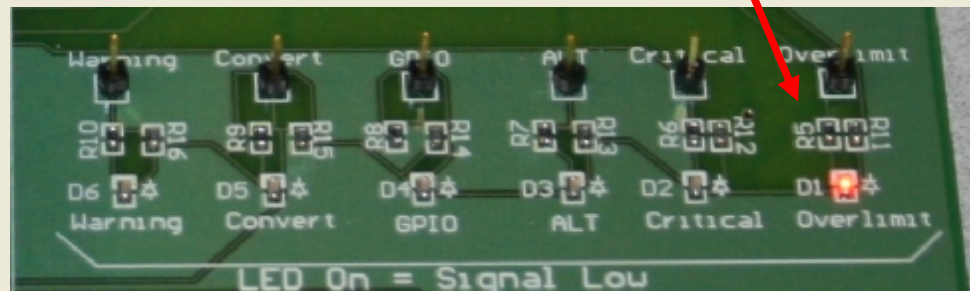
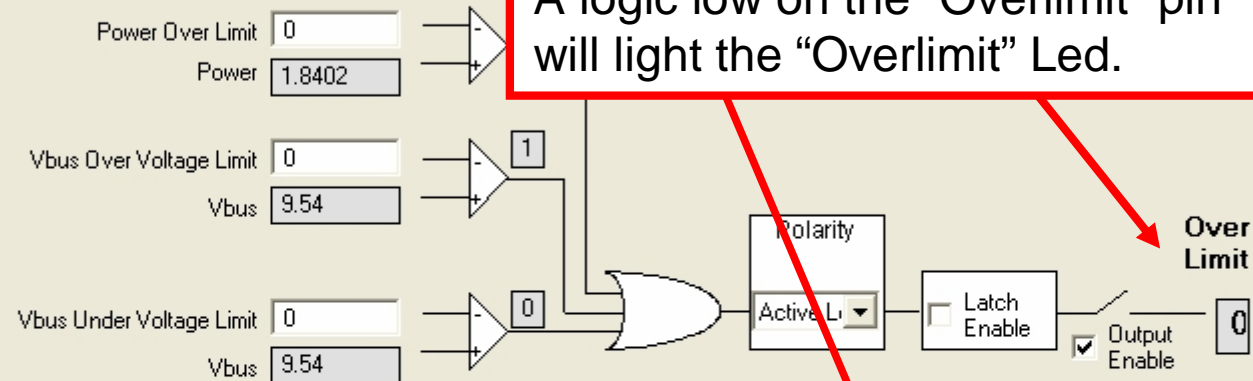
Read All Reg Write all Edited Start Continuous Read Stop Continuous Read

The “Overlimit” tab allows for the configuration “Overlimit” alarm. This tab functions the same as the “Warning” tab. In applications “Overlimit” is used for more severe conditions.

Vbus 9.54 V I_shunt .19291 A Vshunt .19291 V P_in 1.8402 W

Overview (1) | A/D Config (2) | Calibrate (3) | Warning (4) | **Overlimit (5)** | Critical Fault (6) | SMB Alert (7) | Scaling Overview | Graph | Registers

Enter the Overlimit



Read All
Reg

Write all
Edited

Start
Continuous
Read

Stop
Continuous
Read

INA209 EVM

EVM Controls USB Controls Help

Vbus 9.54 V I_shunt .19291 A Vshunt .19291 V P_in 1.8402 W

Overview (1) | A/D Config (2) | Calibrate (3) | Warning (4) | Overlimit (5) | **Critical Fault (6)** | SMB Alert (7) | Scaling Overview | Graph | Registers |

Enter Critical Fault Configuration

The “Critical Fault” tab allows for the configuration “Critical Fault” alarm. This alarm is a analog path; digitally programmable analog comparators. This allows for fast response to serious failures.

The diagram illustrates the internal logic of the Critical Fault configuration. A 'Shunt Voltage' input (0.19291 V) is fed into a 'Hysteresis' block. The output of the hysteresis block is connected to a 'Polarity' block (set to 'Active Low'). The output of the polarity block is connected to a 'Latch Enable' block (checkbox). The output of the latch enable block is connected to an 'Output Enable' block (checkbox). The final output is the 'Critical Fault' signal (1). The diagram also shows 'Critical DAC+' and 'Critical DAC-' inputs (both 0) connected to comparators (1 and 0) that feed into the hysteresis block. At the bottom, there are four buttons: 'Read All Reg', 'Write all Edited', 'Start Continuous Read', and 'Stop Continuous Read'.

Read All Reg Write all Edited Start Continuous Read Stop Continuous Read

INA209 EVM

EVM Controls USB Controls Help

Vbus 9.54 V I_shunt .19291 A Vshunt .19291 V P_in 1.8406 W

Overview (1) | A/D Config (2) | Calibrate (3) | Warning (4) | Overlimit (5) | **Critical Fault (6)** | SMB Alert (7) | Scaling Overview | Graph | Registers

Enter Critical Fault Configuration

Shunt Voltage .19291

Critical DAC+ 0

1

Hysteresis 0mV

0

Critical DAC- 0

Polarity Active Low

☐ Latch Enable

☒ Output Enable

Critical Fault 0

A logic low on the "Critical Fault" pin will light the "Critical Fault" Led.

D6 Warning D5 Convert D4 GPIO D3 ALT D2 Critical D1 Overlimit

LED On = Signal Low

Read All Reg Write all Edited Start Continuous Read Stop Continuous Read

INA209 EVM

EVM Controls USB Controls Help

Vbus V I_shunt A Vshunt V P_in W

Overview (1) | A/D Config (2) | Calibrate (3) | Warning (4) | Overlimit (5) | Critical Fault (6) | **SMB Alert (7)** | Scaling Overview | Graph | Registers

Enter Mask Configuration

| Flags from Warning, Overlimit, Critical Fault, and Convert | Mask Bits will be Logically ANDed with Flags |
|--|--|
| WDOV <input type="checkbox" value="1"/> | M_WDOV <input type="checkbox" value="0"/> |
| WUV <input type="checkbox" value="0"/> | M_WUV <input type="checkbox" value="0"/> |
| WP <input type="checkbox" value="0"/> | M_WP <input type="checkbox" value="0"/> |
| WS+ <input type="checkbox" value="1"/> | M_WS+ <input type="checkbox" value="0"/> |
| WS- <input type="checkbox" value="0"/> | M_WS- <input type="checkbox" value="0"/> |
| OLOV <input type="checkbox" value="1"/> | M_OLOV <input type="checkbox" value="0"/> |
| OLUV <input type="checkbox" value="0"/> | M_OLUV <input type="checkbox" value="0"/> |
| OLP <input type="checkbox" value="1"/> | M_OLP <input type="checkbox" value="0"/> |
| CRIT+ <input type="checkbox" value="1"/> | M_CRIT+ <input type="checkbox" value="0"/> |
| CRIT- <input type="checkbox" value="0"/> | M_CRIT- <input type="checkbox" value="0"/> |
| CNVR <input type="checkbox" value="1"/> | M_CNVR <input type="checkbox" value="0"/> |

Any combination of the alarm flags can be used to set the "Alert" pin. The mask register allows you to select or omit specific flags.

Logical OR of Masked Flags

Alert (Active Low)

☐ Output Enable

Read All Reg Write all Edited Start Continuous Read Stop Continuous Read

INA209 EVM

EVM Controls USB Controls Help

Vbus 9.54 V I_shunt .19291 A Vshunt .19296 V P_in 1.8412 W

Overview (1) | A/D Config (2) | Calibrate (3) | Warning (4) | Overlimit (5) | Critical Fault (6) | **SMB Alert (7)** | Scaling Overview | Graph | Registers

Enter Mask Configuration

Flags from Warning, Overlimit, Critical Fault, and Convert

| | | | |
|-------|--------------------------|---------|--------------------------|
| WOV | <input type="checkbox"/> | M_WOV | <input type="checkbox"/> |
| WUV | <input type="checkbox"/> | M_WUV | <input type="checkbox"/> |
| WP | <input type="checkbox"/> | M_WP | <input type="checkbox"/> |
| WS+ | <input type="checkbox"/> | M_WS+ | <input type="checkbox"/> |
| WS- | <input type="checkbox"/> | M_WS- | <input type="checkbox"/> |
| OLOV | <input type="checkbox"/> | M_OLOV | <input type="checkbox"/> |
| OLUV | <input type="checkbox"/> | M_OLUV | <input type="checkbox"/> |
| OLP | <input type="checkbox"/> | M_OLP | <input type="checkbox"/> |
| CRIT+ | <input type="checkbox"/> | M_CRIT+ | <input type="checkbox"/> |
| CRIT- | <input type="checkbox"/> | M_CRIT- | <input type="checkbox"/> |
| CNVR | <input type="checkbox"/> | M_CNVR | <input type="checkbox"/> |

Mask Bits will be Logically ANDed with Flags

Logical OR of Masked Flags

Alert (Active Low)

☒ Output Enable

A logic low on the "Alert" pin will light the "ALT" Led.

Warning Convert GPIO ALT Critical Overlimit

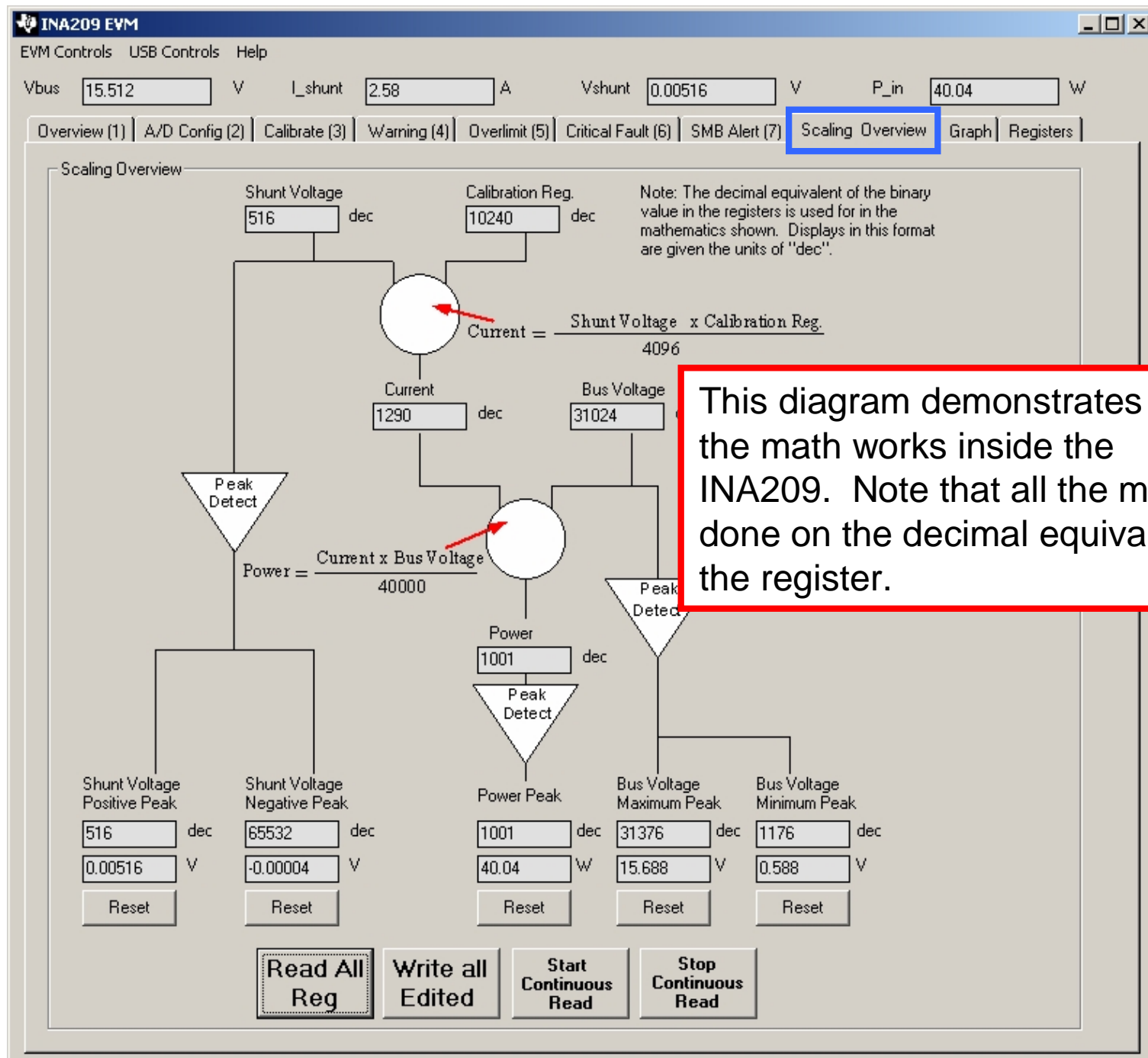
07 06 05 04 03 02 01

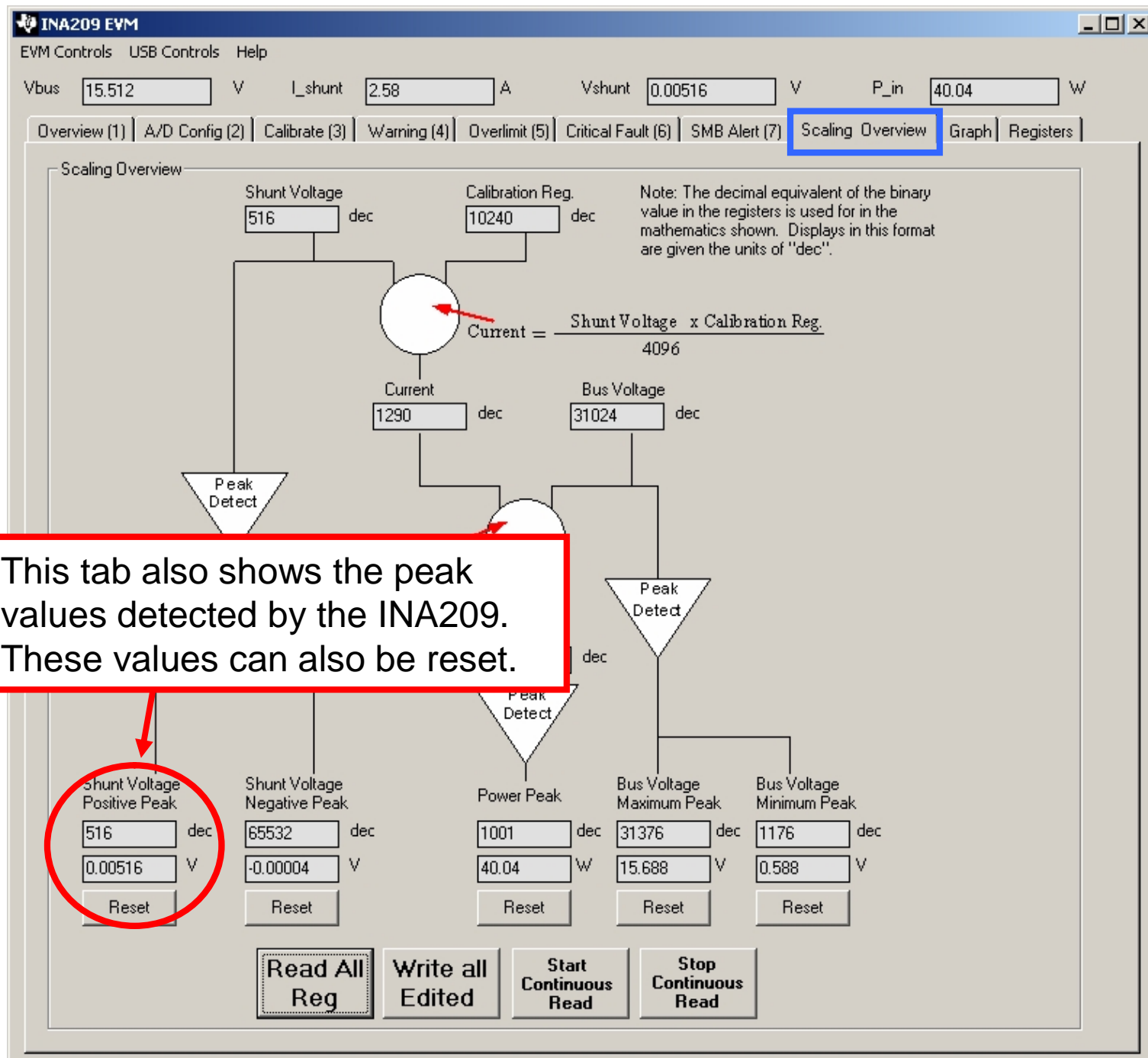
06 05 04 03 02 01

Warning Convert GPIO ALT Critical Overlimit

LED On = Signal Low

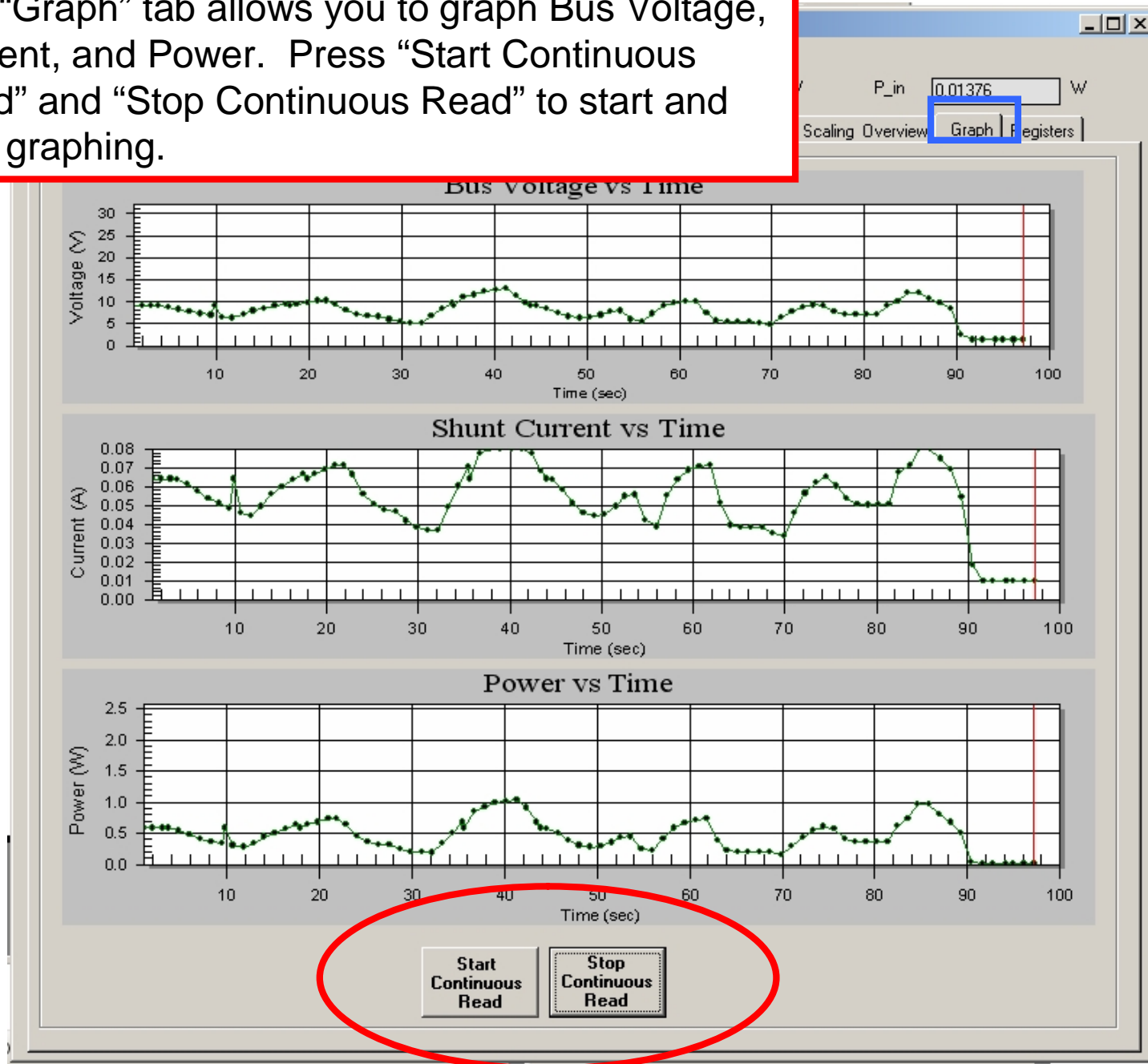
Read All Reg Write all Edited Start Continuous Read Stop Continuous Read

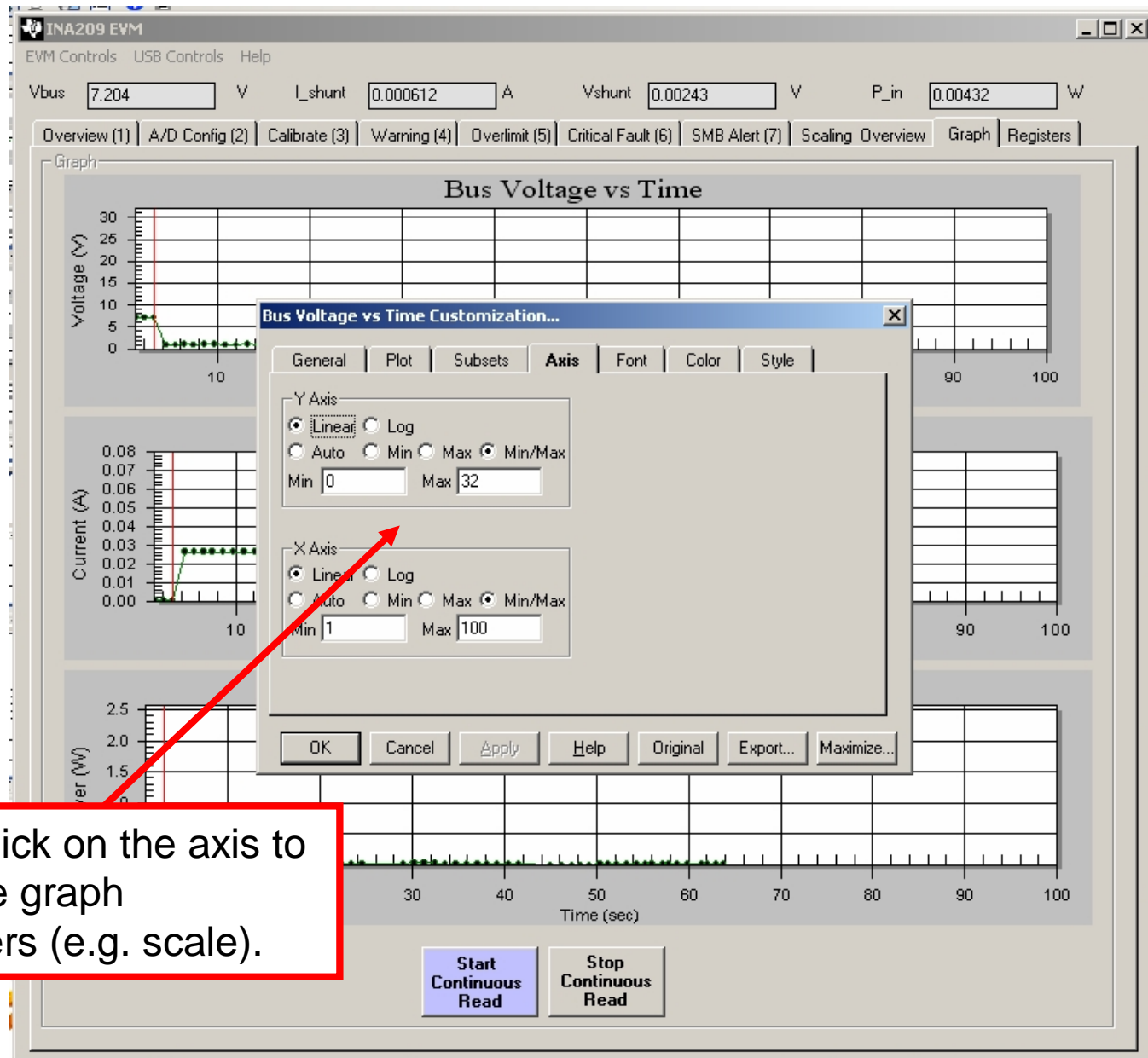




This tab also shows the peak values detected by the INA209. These values can also be reset.

The “Graph” tab allows you to graph Bus Voltage, Current, and Power. Press “Start Continuous Read” and “Stop Continuous Read” to start and stop graphing.





Double click on the axis to adjust the graph parameters (e.g. scale).

This tab shows all the registers in hex, binary, and analog for the INA209.

INA209 EVM

EVM Controls USB Controls Help

Vshunt 0.10493 V P_in 0.02704 W

Critical Fault (6) SMB Alert (7) Scaling Overview Graph **Registers**

| | | | Binary | Analog |
|-----|-----------------------------------|--------|-----------------------|----------|
| 01h | Status | 0xB5A0 | 0x0011_1001_1001_1111 | |
| 02h | SMBus Alert Mask / Enable Control | 0x0000 | 0x0000_0000_0000_0000 | |
| 03h | Shunt Voltage | 0x28FD | 0x0010_1000_1111_1101 | 0.10493 |
| 04h | Bus Voltage | 0x0800 | 0x0000_1000_0000_0000 | 1.024 |
| 05h | Power | 0x0152 | 0x0000_0001_0101_0010 | 0.02704 |
| 06h | Current / PGA | 0x199E | 0x0001_1001_1001_1110 | 0.026232 |
| 07h | Shunt + Peak | 0x2901 | 0x0010_1001_0000_0001 | 0.10497 |
| 08h | Shunt - Peak | 0x28F9 | 0x0010_1000_1111_1001 | 0.10489 |
| 09h | Bus V Max Peak | 0x0810 | 0x0000_1000_0001_0000 | 1.032 |
| 0Ah | Bus V Low Peak | 0x07F8 | 0x0000_0111_1111_1000 | 1.02 |
| 0Bh | Power Peak | 0x0152 | 0x0000_0001_0101_0010 | 0.02704 |
| 0Ch | Shunt +Warning | 0x0000 | 0x0000_0000_0000_0000 | 0 |
| 0Dh | Shunt -Warning | 0x0000 | 0x0000_0000_0000_0000 | 0 |
| 0Eh | Power Warning | 0x0000 | 0x0000_0000_0000_0000 | 0 |
| 0Fh | Bus Over Voltage Warning | 0x0000 | 0x0000_0000_0000_0000 | 0 |
| 10h | Bus Under Voltage Warning | 0x0000 | 0x0000_0000_0000_0000 | 0 |
| 11h | Power Overlimit | 0x0000 | 0x0000_0000_0000_0000 | 0 |
| 12h | Bus Over Voltage Overlimit | 0x0000 | 0x0000_0000_0000_0000 | 0 |
| 13h | Bus Under Voltage Overlimit | 0x0000 | 0x0000_0000_0000_0000 | 0 |
| 14h | Critical DAC+ | 0x0080 | 0x0000_0000_1000_0000 | 0 |
| 15h | Critical DAC- | 0x0000 | 0x0000_0000_0000_0000 | 0 |
| 16h | Full Scale Cal | 0x0A00 | 0x0000_1010_0000_0000 | |

Read All Reg Write all Edited Write Current Reg Start Continuous Read Stop Continuous Read Help With Current Reg

Register Bit Map

| | | | | | | | |
|--------|--------|--------|--------|--------|--------|--------|--------|
| Reset | D14 | BRNG | PG1 | PG0 | B_ADC4 | B_ADC3 | B_ADC2 |
| 0 | 0 | 1 | 1 | 1 | 0 | 0 | 1 |
| B_ADC1 | S_ADC4 | S_ADC3 | S_ADC2 | S_ADC1 | MODE3 | MODE2 | MODE1 |
| 1 | 0 | 0 | 1 | 1 | 1 | 1 | 1 |

Hex Reg: 399F

Analog Reg: 0

Click on a row in the register table to select the register. The individual bits with their functional labels will show up in the “Register Bit Map” below.

The screenshot displays a software interface for managing registers. At the top, a text box instructs the user to click on a row in the register table to select a register, which will then show its individual bits in the "Register Bit Map" below. The register table lists 17 registers (00h to 16h) with their names, hex values, binary values, and analog values. The 'Config' register (00h) is selected, highlighted in cyan, and its hex value '0x399F' is shown in the top right. Below the table, a row of buttons includes 'Read All Reg', 'Write all Edited', 'Write Current Reg', 'Start Continuous Read', 'Stop Continuous Read', and 'Help With Current Reg'. The 'Register Bit Map' section at the bottom shows a grid of bits and their current values. The bits are arranged in two rows: Reset, D14, BRNG, PG1, PG0, B_ADC4, B_ADC3, B_ADC2 in the first row, and B_ADC1, S_ADC4, S_ADC3, S_ADC2, S_ADC1, MODE3, MODE2, MODE1 in the second row. The values are displayed in boxes: Reset (0), D14 (0), BRNG (1), PG1 (1), PG0 (1), B_ADC4 (0), B_ADC3 (0), B_ADC2 (1), B_ADC1 (1), S_ADC4 (0), S_ADC3 (0), S_ADC2 (1), S_ADC1 (1), MODE3 (1), MODE2 (1), and MODE1 (1). To the right of the bit map, there are fields for 'Hex Reg:' (399F) and 'Analog Reg:' (0).

| Addr | Name | Hex | Binary | Analog |
|------|-----------------------------------|--------|-----------------------|----------|
| 00h | Config | 0x399F | 0x0011_1001_1001_1111 | |
| 01h | Status | 0xB5A0 | 0x1011_0101_1010_0000 | |
| 02h | SMBus Alert Mask / Enable Control | 0x0000 | 0x0000_0000_0000_0000 | |
| 03h | Shunt Voltage | 0x28FD | 0x0010_1000_1111_1101 | 0.10493 |
| 04h | Bus Voltage | 0x0800 | 0x0000_1000_0000_0000 | 1.024 |
| 05h | Power | 0x0152 | 0x0000_0001_0101_0010 | 0.02704 |
| 06h | Current / PGA | 0x199E | 0x0001_1001_1001_1110 | 0.026232 |
| 07h | Shunt + Peak | 0x2901 | 0x0010_1001_0000_0001 | 0.10497 |
| 08h | Shunt - Peak | 0x28F9 | 0x0010_1000_1111_1001 | 0.10489 |
| 09h | Bus V Max Peak | 0x0810 | 0x0000_1000_0001_0000 | 1.032 |
| 0Ah | Bus V Low Peak | 0x07F8 | 0x0000_0111_1111_1000 | 1.02 |
| 0Bh | Power Peak | 0x0152 | 0x0000_0001_0101_0010 | 0.02704 |
| 0Ch | Shunt +Warning | 0x0000 | 0x0000_0000_0000_0000 | 0 |
| 0Dh | Shunt -Warning | 0x0000 | 0x0000_0000_0000_0000 | 0 |
| 0Eh | Power Warning | 0x0000 | 0x0000_0000_0000_0000 | 0 |
| 0Fh | Bus Over Voltage Warning | 0x0000 | 0x0000_0000_0000_0000 | 0 |
| 10h | Bus Under Voltage Warning | 0x0000 | 0x0000_0000_0000_0000 | 0 |
| 11h | Power Overlimit | 0x0000 | 0x0000_0000_0000_0000 | 0 |
| 12h | Bus Over Voltage Overlimit | 0x0000 | 0x0000_0000_0000_0000 | 0 |
| 13h | Bus Under Voltage Overlimit | 0x0000 | 0x0000_0000_0000_0000 | 0 |
| 14h | Critical DAC+ | 0x0080 | 0x0000_0000_1000_0000 | 0 |
| 15h | Critical DAC- | 0x0000 | 0x0000_0000_0000_0000 | 0 |
| 16h | Full Scale Cal | 0x0A00 | 0x0000_1010_0000_0000 | |

Register Bit Map

| | | | | | | | |
|--------|--------|--------|--------|--------|--------|--------|--------|
| Reset | D14 | BRNG | PG1 | PG0 | B_ADC4 | B_ADC3 | B_ADC2 |
| 0 | 0 | 1 | 1 | 1 | 0 | 0 | 1 |
| B_ADC1 | S_ADC4 | S_ADC3 | S_ADC2 | S_ADC1 | MODE3 | MODE2 | MODE1 |
| 1 | 0 | 0 | 1 | 1 | 1 | 1 | 1 |

Hex Reg: 399F

Analog Reg: 0

- Click on individual bits to edit the “Register Bit Map”. A click on a bit will change ‘0’ to ‘1’ or ‘1’ to ‘0’.
- Type a value into the “Analog Reg” box to change the analog value. In this example we will change from analog = 0V to analog = 2V.

| | | | | |
|-----|-----------------------------------|--------|-----------------------|---------|
| 01h | Status | 0xB5A0 | 0x1011_0101_1010_0000 | |
| 02h | SMBus Alert Mask / Enable Control | 0x0000 | 0x0000_0000_0000_0000 | |
| 03h | Shunt Voltage | 0x00EF | 0x0000_0000_1110_1111 | 0.00239 |
| 04h | Bus Voltage | 0x3830 | 0x0011_1000_0011_0000 | 7.192 |
| 05h | Power | 0x0036 | 0x0000_0000_0011_0110 | 0.00432 |
| 06h | Current / PGA | 0x0096 | 0x0000_0000_1001_0110 | 0.0006 |
| 07h | Shunt + Peak | 0x7D00 | 0x0111_1101_0000_0000 | 0.32 |
| 08h | Shunt - Peak | 0x8300 | 0x1000_0011_0000_0000 | -0.32 |
| 09h | Bus V Max Peak | 0x3880 | 0x0011_1000_1000_0000 | 7.232 |
| 0Ah | Bus V Low Peak | 0x0000 | 0x0000_0000_0000_0000 | 0 |
| 0Bh | Power Peak | 0x0038 | 0x0000_0000_0011_1000 | 0.00448 |
| 0Ch | Shunt +Warning | 0x0000 | 0x0000_0000_0000_0000 | 0 |
| 0Dh | Shunt -Warning | 0x0000 | 0x0000_0000_0000_0000 | 0 |
| 0Eh | Power Warning | 0x0000 | 0x0000_0000_0000_0000 | 0 |
| 0Fh | Bus Over Voltage Warning | 0x0000 | 0x0000_0000_0000_0000 | 0 |
| 10h | Bus Under Voltage Warning | 0x0000 | 0x0000_0000_0000_0000 | 0 |
| 11h | Power Overlimit | 0x0000 | 0x0000_0000_0000_0000 | 0 |
| 12h | Bus Over Voltage Overlimit | 0x0000 | 0x0000_0000_0000_0000 | 0 |
| 13h | Bus Under Voltage Overlimit | 0x0000 | 0x0000_0000_0000_0000 | 0 |
| 14h | Critical DAC+ | 0x0080 | 0x0000_0000_1000_0000 | 0 |
| 15h | Critical DAC- | 0x0000 | 0x0000_0000_0000_0000 | 0 |
| 16h | Full Scale Cal | 0x0A00 | 0x0000_1010_0000_0000 | |

Read All Reg
Write all Edited
Write Current Reg
Start Continuous Read
Stop Continuous Read
Help With Current Reg

Register Bit Map

| | | | | | | | | |
|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|---------------|
| BW012 | BW011 | BW010 | BW009 | BW008 | BW007 | BW006 | BW005 | Hex Reg: 0000 |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| BW004 | BW003 | BW002 | BW001 | BW000 | RFB | WPL | WNL | Analog Reg: 0 |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |

Note that we changed the analog from 0V to 2V and the Hex register updated from 0000H to 0FA0H.

0.02704 W

Overview (1) | A/D Config (2) | Calibrate (3) | Warning (4) | Overlimit (5) | Critical Fault (6) | SMB Alert (7) | Scaling Overview | Graph | **Registers**

INA206 Registers

| Addr | Name | Hex | Binary | Analog |
|------|-----------------------------------|--------|-----------------------|----------|
| 00h | Config | 0x399F | 0x0011_1001_1001_1111 | |
| 01h | Status | 0xB5A0 | 0x1011_0101_1010_0000 | |
| 02h | SMBus Alert Mask / Enable Control | 0x0000 | 0x0000_0000_0000_0000 | |
| 03h | Shunt Voltage | 0x28FC | 0x0010_1000_1111_1100 | 0.10492 |
| 04h | Bus Voltage | 0x0808 | 0x0000_1000_0000_1000 | 1.028 |
| 05h | Power | 0x0152 | 0x0000_0001_0101_0010 | 0.02704 |
| 06h | Current / PGA | 0x199E | 0x0001_1001_1001_1110 | 0.026232 |
| 07h | Shunt + Peak | 0x2903 | 0x0010_1001_0000_0011 | 0.10499 |
| 08h | Shunt - Peak | 0x28F6 | 0x0010_1000_1111_0110 | 0.10486 |
| 09h | Bus V Max Peak | 0x0810 | 0x0000_1000_0001_0000 | 1.032 |
| 0Ah | Bus V Low Peak | 0x07F8 | 0x0000_0111_1111_1000 | 1.02 |
| 0Bh | Power Peak | 0x0153 | 0x0000_0001_0101_0011 | 0.02712 |
| 0Ch | Shunt +Warning | 0x0000 | 0x0000_0000_0000_0000 | 0 |
| 0Dh | Shunt -Warning | 0x0000 | 0x0000_0000_0000_0000 | 0 |
| 0Eh | Power Warning | 0x0000 | 0x0000_0000_0000_0000 | 0 |
| 0Fh | Bus Over Voltage Warning | 0x0FA0 | 0x0000_1111_1010_0000 | 2 |
| 10h | Bus Under Voltage Warning | 0x0000 | 0x0000_0000_0000_0000 | 0 |
| 11h | Power Overlimit | 0x0000 | 0x0000_0000_0000_0000 | 0 |
| 12h | Bus Over Voltage Overlimit | 0x0000 | 0x0000_0000_0000_0000 | 0 |
| 13h | Bus Under Voltage Overlimit | 0x0000 | 0x0000_0000_0000_0000 | 0 |
| 14h | Critical DAC+ | 0x0080 | 0x0000_0000_1000_0000 | 0 |
| 15h | Critical DAC- | 0x0000 | 0x0000_0000_0000_0000 | 0 |
| 16h | Full Scale Cal | 0x0A00 | 0x0000_1010_0000_0000 | |

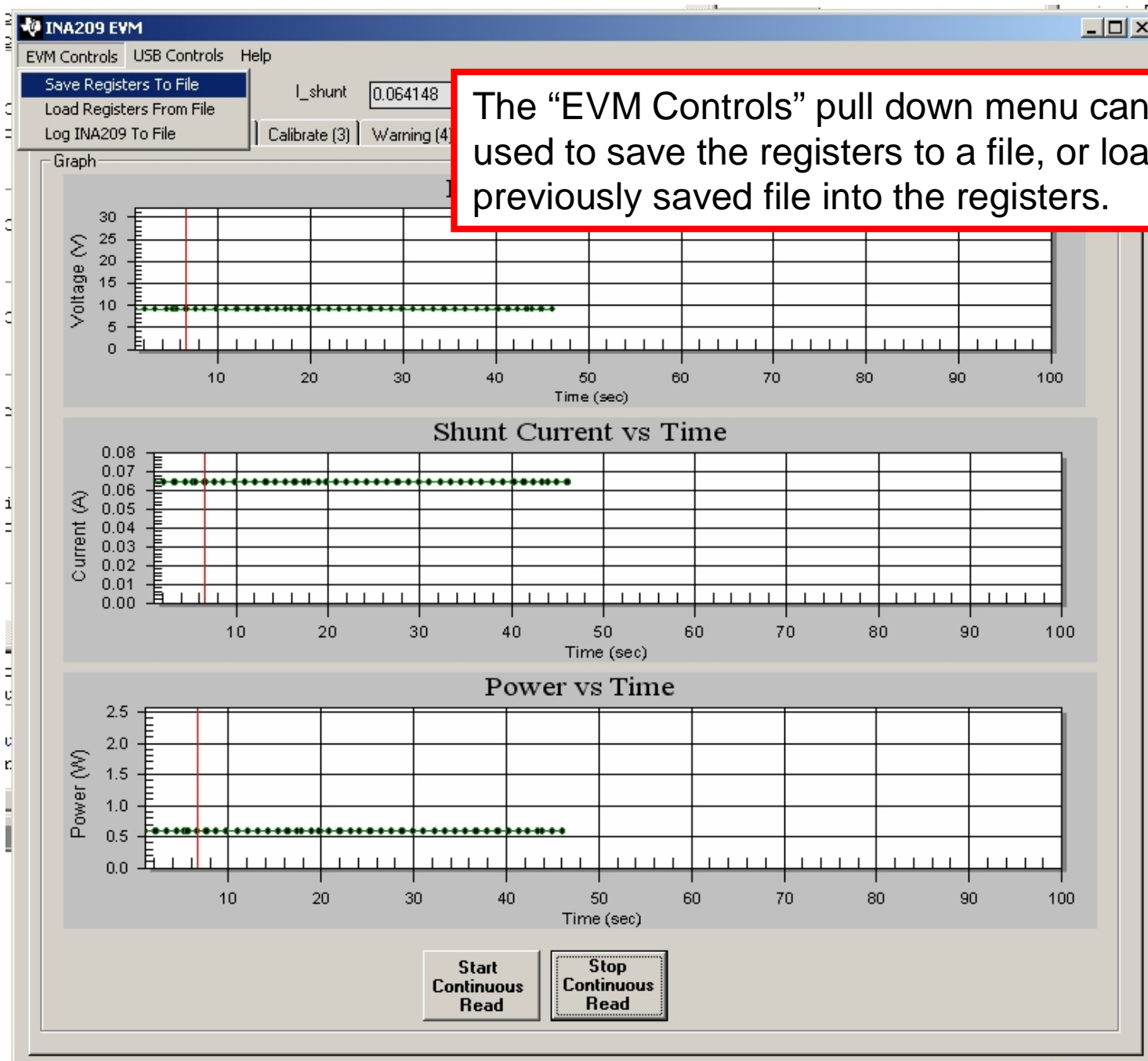
Read All Reg | Write all Edited | Write Current Reg | Start Continuous Read | Stop Continuous Read | Help With Current Reg

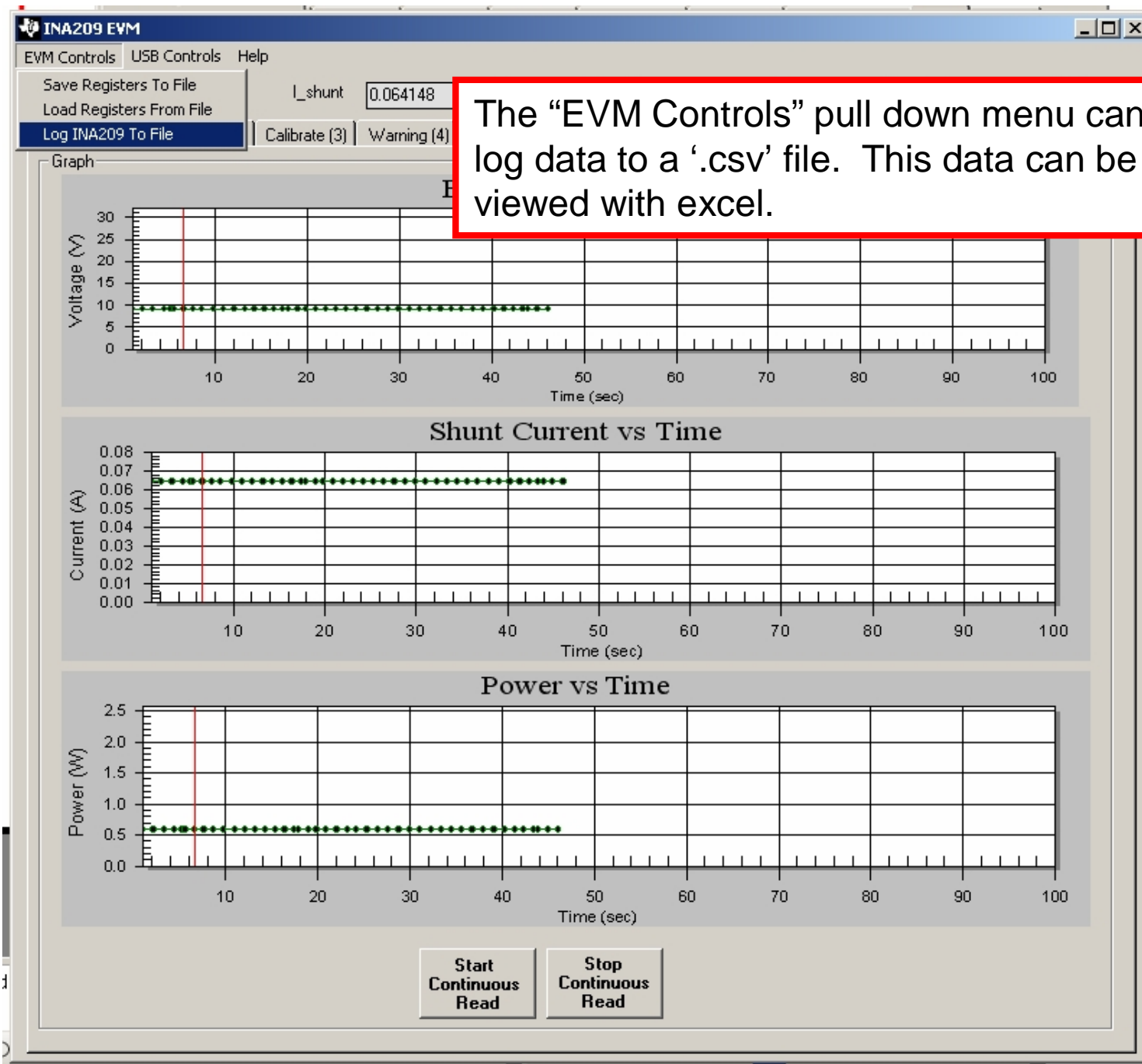
Register Bit Map

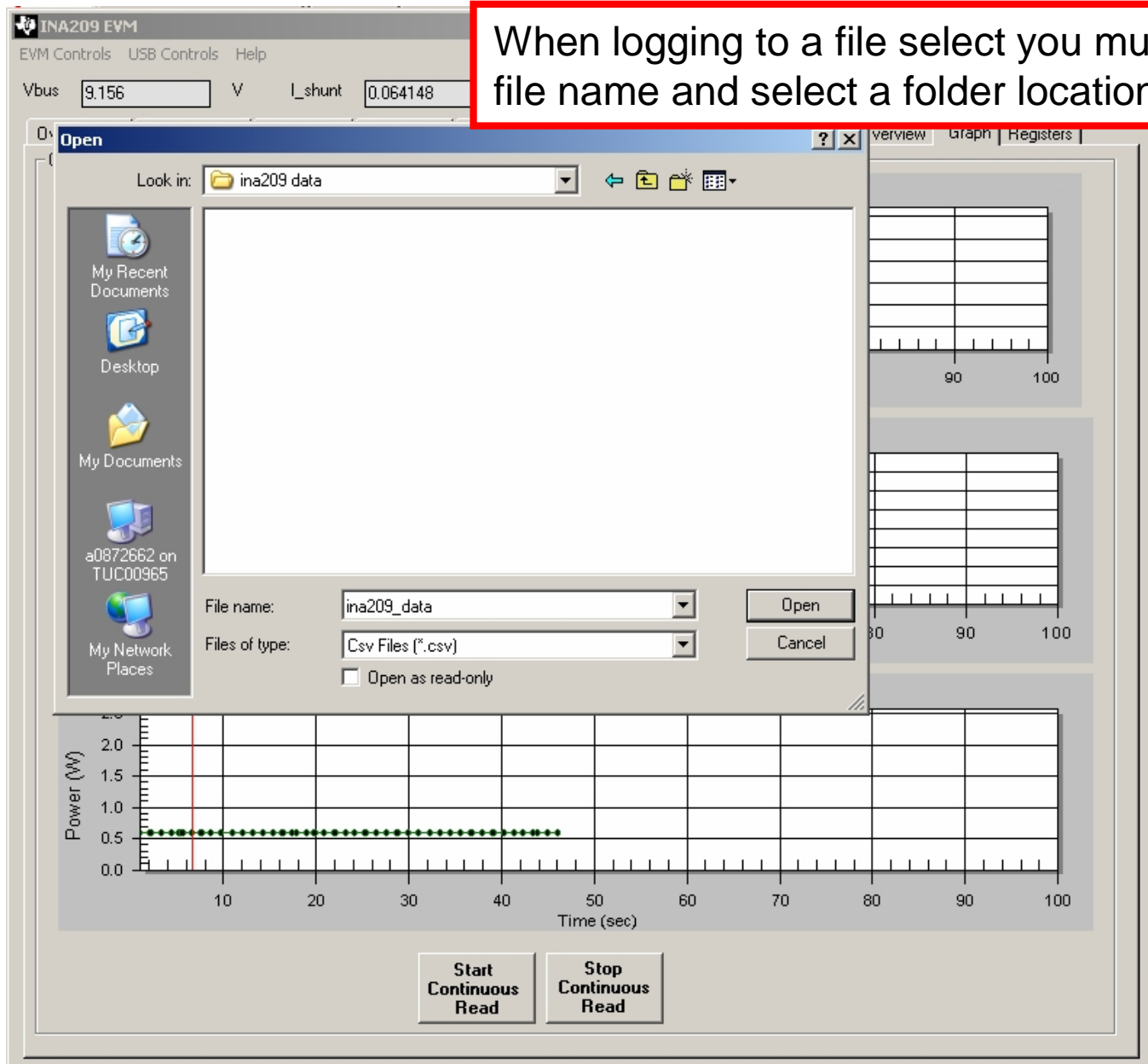
| | | | | | | | |
|-------|-------|-------|-------|-------|-------|-------|-------|
| BW012 | BW011 | BW010 | BW009 | BW008 | BW007 | BW006 | BW005 |
| 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 |
| BW004 | BW003 | BW002 | BW001 | BW000 | RFB | WPL | WNL |
| 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |

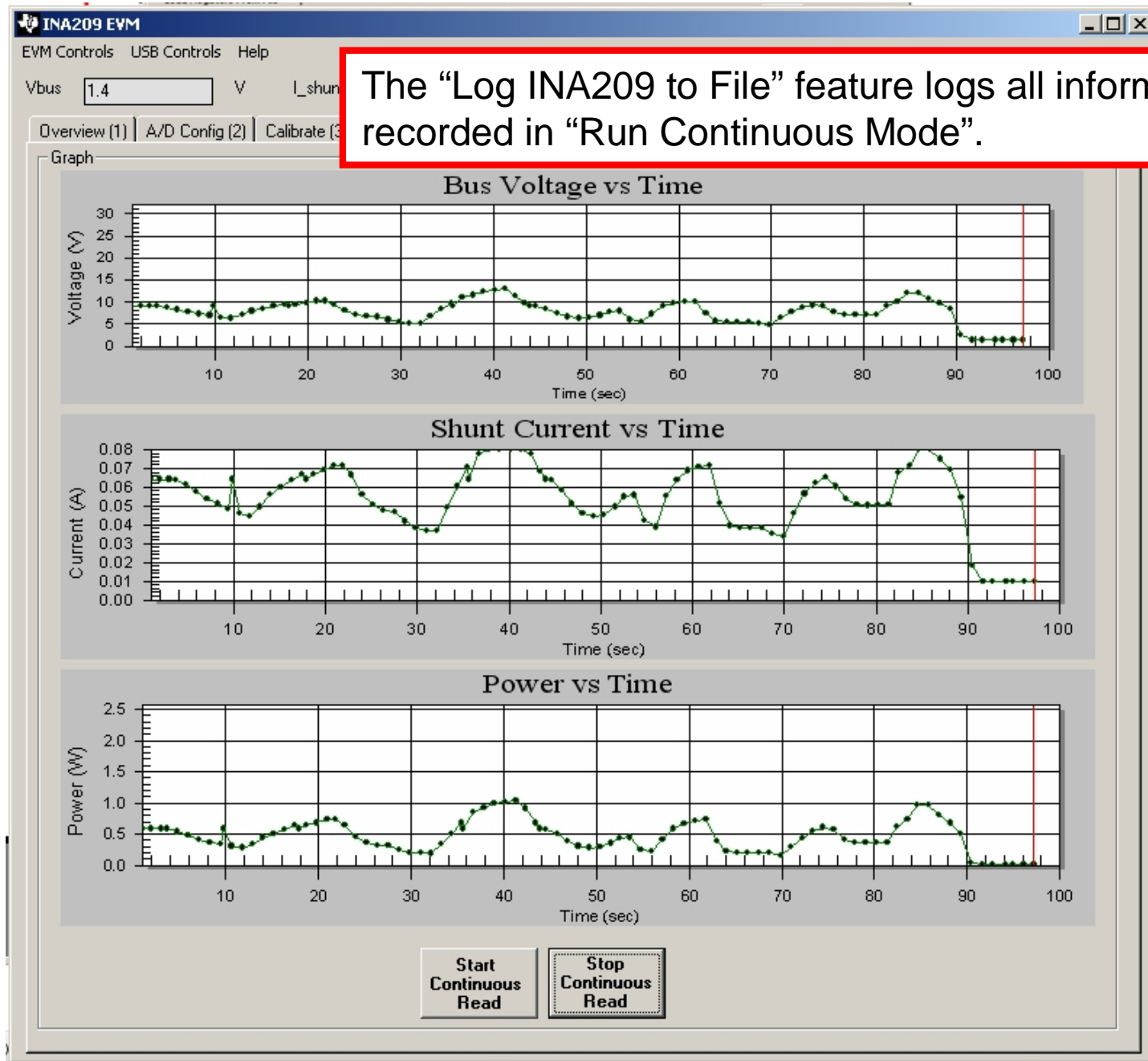
Hex Reg: 0FA0

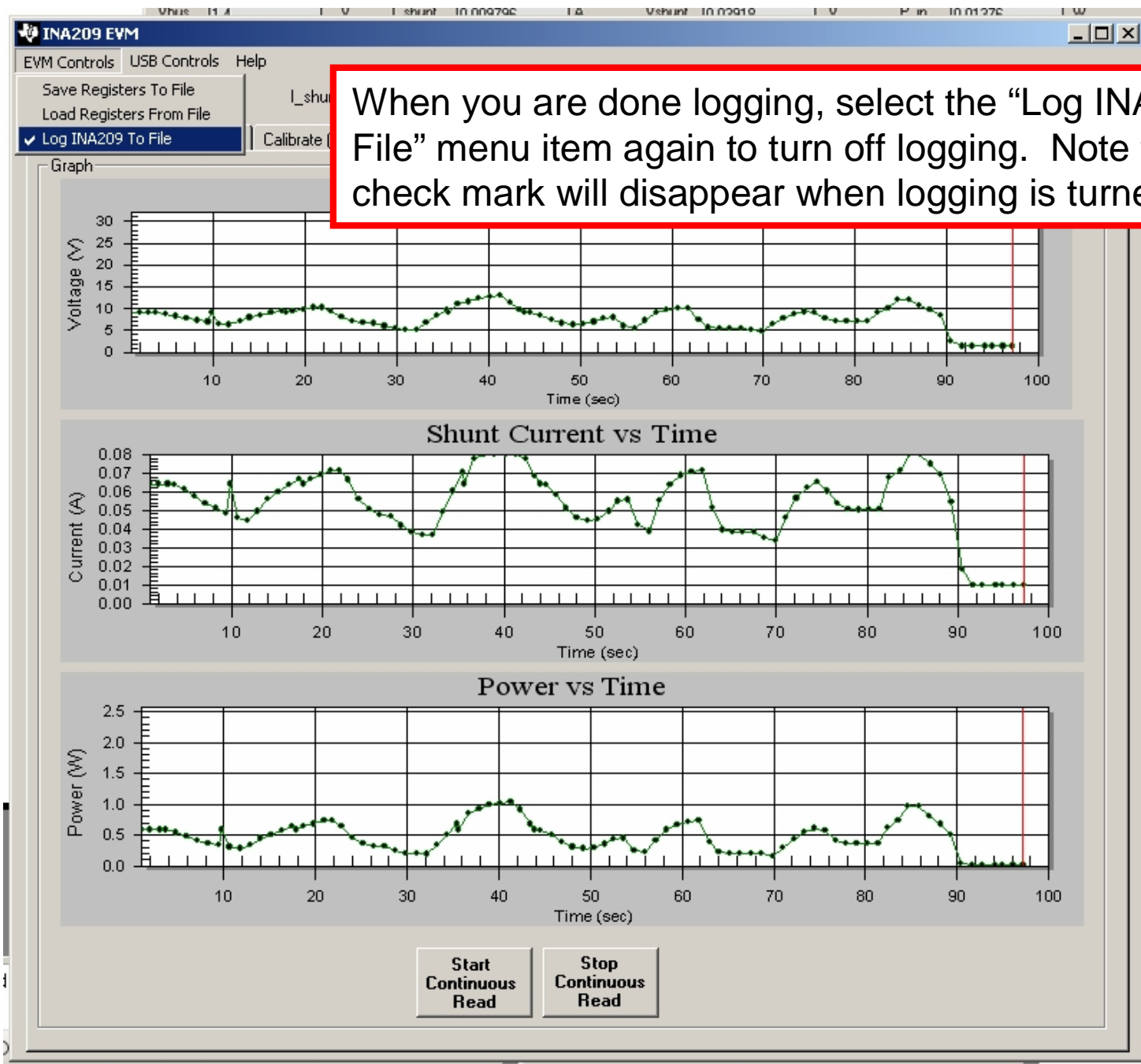
Analog Reg: 2

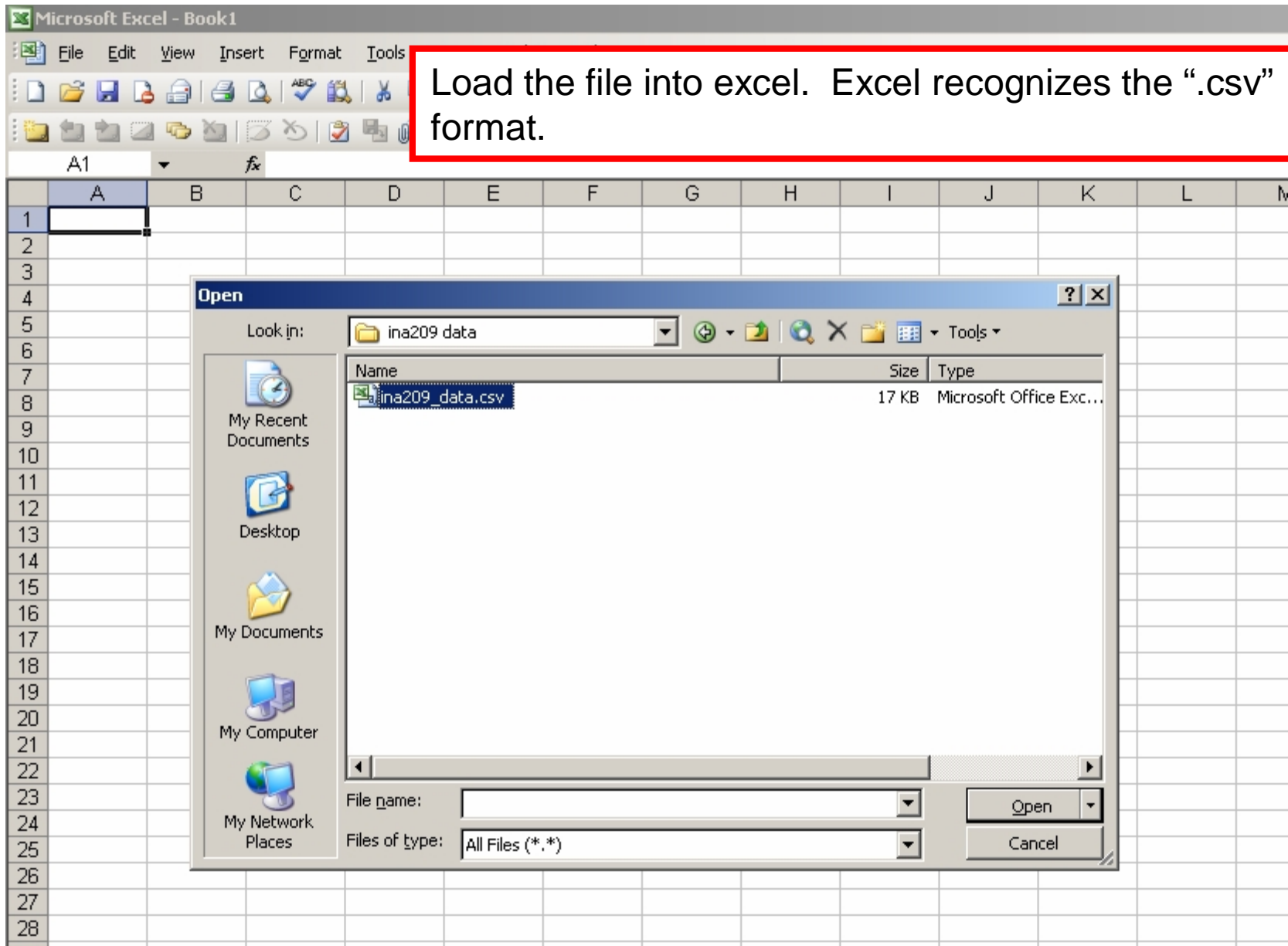












The log file contains all the registers.

Microsoft Excel - ina209_data.csv

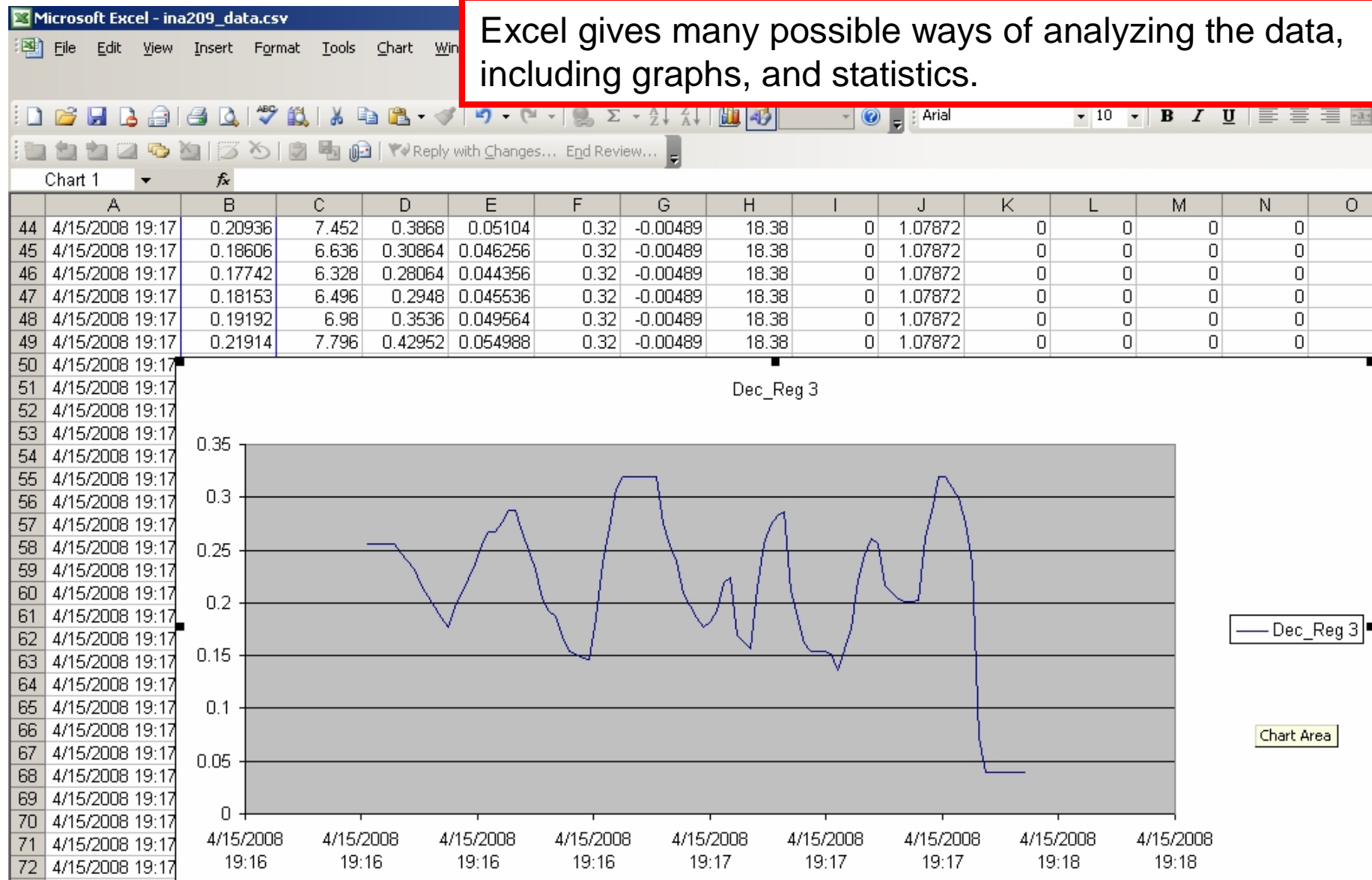
File Edit View Insert Format Tools Data Window Help

100% Arial 10

Reply with Changes... End Review...

A1 Date_Stamp

| | A | B | C | D | E | F | G | H | I | J | K | L |
|----|-----------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|------------|------------|------------|------------|
| 1 | Date_Stamp | Dec_Reg 3 | Dec_Reg 4 | Dec_Reg 5 | Dec_Reg 6 | Dec_Reg 7 | Dec_Reg 8 | Dec_Reg 9 | Dec_Reg 10 | Dec_Reg 11 | Dec_Reg 12 | Dec_Reg 13 |
| 2 | 4/15/2008 19:16 | 0.25641 | 9.152 | 0.58672 | 0.064104 | 0.32 | -0.00489 | 18.38 | 0 | 1.07872 | 0 | 0 |
| 3 | 4/15/2008 19:16 | 0.25641 | 9.152 | 0.58672 | 0.064104 | 0.32 | -0.00489 | 18.38 | 0 | 1.07872 | 0 | 0 |
| 4 | 4/15/2008 19:16 | 0.25641 | 9.152 | 0.58672 | 0.064104 | 0.32 | -0.00489 | 18.38 | 0 | 1.07872 | 0 | 0 |
| 5 | 4/15/2008 19:16 | 0.25641 | 9.152 | 0.58672 | 0.064096 | 0.32 | -0.00489 | 18.38 | 0 | 1.07872 | 0 | 0 |
| 6 | 4/15/2008 19:16 | 0.25599 | 9.14 | 0.58472 | 0.063976 | 0.32 | -0.00489 | 18.38 | 0 | 1.07872 | 0 | 0 |
| 7 | 4/15/2008 19:16 | 0.24649 | 8.768 | 0.54032 | 0.061424 | 0.32 | -0.00489 | 18.38 | 0 | 1.07872 | 0 | 0 |
| 8 | 4/15/2008 19:16 | 0.23163 | 8.264 | 0.47856 | 0.057896 | 0.32 | -0.00489 | 18.38 | 0 | 1.07872 | 0 | 0 |
| 9 | 4/15/2008 19:16 | 0.21586 | 7.68 | 0.41448 | 0.053692 | 0.32 | -0.00489 | 18.38 | 0 | 1.07872 | 0 | 0 |
| 10 | 4/15/2008 19:16 | 0.20584 | 7.304 | 0.37064 | 0.051036 | 0.32 | -0.00489 | 18.38 | 0 | 1.07872 | 0 | 0 |
| 11 | 4/15/2008 19:16 | 0.19553 | 7 | 0.3396 | 0.048564 | 0.32 | -0.00489 | 18.38 | 0 | 1.07872 | 0 | 0 |
| 12 | 4/15/2008 19:16 | 0.18563 | 6.584 | 0.30552 | 0.045824 | 0.32 | -0.00489 | 18.38 | 0 | 1.07872 | 0 | 0 |
| 13 | 4/15/2008 19:16 | 0.17742 | 6.328 | 0.28064 | 0.044356 | 0.32 | -0.00489 | 18.38 | 0 | 1.07872 | 0 | 0 |
| 14 | 4/15/2008 19:16 | 0.19597 | 7.048 | 0.34528 | 0.049544 | 0.32 | -0.00489 | 18.38 | 0 | 1.07872 | 0 | 0 |
| 15 | 4/15/2008 19:16 | 0.22298 | 7.956 | 0.44352 | 0.055792 | 0.32 | -0.00489 | 18.38 | 0 | 1.07872 | 0 | 0 |
| 16 | 4/15/2008 19:16 | 0.23707 | 8.524 | 0.5052 | 0.060008 | 0.32 | -0.00489 | 18.38 | 0 | 1.07872 | 0 | 0 |
| 17 | 4/15/2008 19:16 | 0.25491 | 9.124 | 0.58144 | 0.063972 | 0.32 | -0.00489 | 18.38 | 0 | 1.07872 | 0 | 0 |
| 18 | 4/15/2008 19:16 | 0.26686 | 9.524 | 0.63544 | 0.066716 | 0.32 | -0.00489 | 18.38 | 0 | 1.07872 | 0 | 0 |
| 19 | 4/15/2008 19:16 | 0.26685 | 9.524 | 0.63528 | 0.066712 | 0.32 | -0.00489 | 18.38 | 0 | 1.07872 | 0 | 0 |
| 20 | 4/15/2008 19:16 | 0.27623 | 9.86 | 0.68096 | 0.069392 | 0.32 | -0.00489 | 18.38 | 0 | 1.07872 | 0 | 0 |
| 21 | 4/15/2008 19:16 | 0.28718 | 10.252 | 0.736 | 0.071792 | 0.32 | -0.00489 | 18.38 | 0 | 1.07872 | 0 | 0 |
| 22 | 4/15/2008 19:16 | 0.28716 | 10.252 | 0.736 | 0.071792 | 0.32 | -0.00489 | 18.38 | 0 | 1.07872 | 0 | 0 |
| 23 | 4/15/2008 19:16 | 0.26683 | 9.524 | 0.63528 | 0.066592 | 0.32 | -0.00489 | 18.38 | 0 | 1.07872 | 0 | 0 |
| 24 | 4/15/2008 19:16 | 0.23165 | 8.184 | 0.45744 | 0.05608 | 0.32 | -0.00489 | 18.38 | 0 | 1.07872 | 0 | 0 |
| 25 | 4/15/2008 19:16 | 0.20401 | 7.256 | 0.37016 | 0.050672 | 0.32 | -0.00489 | 18.38 | 0 | 1.07872 | 0 | 0 |



**End of
Software Overview
Thank you for your time!**