PRODUCT DESCRIPTION

This evaluation board allows the ADM1191/ADM1192 devices to be easily evaluated. The ADM1191/ADM1192 are integrated current sense amplifiers that offer digital current and voltage monitoring via an on-chip analog-to-digital converter (ADC) communicated through an I^{2}C interface. An internal current sense amplifier senses voltage across the sense resistor in the power path via the VCC and SENSE pins.

The ADC can measure the current seen in the sense resistor and the supply voltage on the VCC pin. An industry standard I^{2}C interface allows a controller to read current and voltage data from the ADC. Measurements can be initiated by an I^{2}C command. Alternatively, the ADC can run continuously, and the latest conversion can be read whenever it is required.

The devices have a SETV pin. A voltage applied to this pin is internally compared to the output voltage on the current sense amplifier. The output of the SETV comparator asserts when the current sense amplifier output exceeds the SETV voltage.

When this event occurs for the ADM1191, the ALERTB output asserts; when the event occurs for the ADM1192, the ALERT output asserts. This alert signal can be used as a flag to warn a microcontroller or field programmable gate array (FPGA) of an overcurrent condition. The alert output of multiple devices can be tied together and used as a combined alert.

EVALUATION BOARD DESCRIPTION

The ADM1191/ADM1192 digital power monitor evaluation board can be controlled using the configuration tool, allowing the device to be actively simulated through software. This evaluation board provides an I^{2}C interface requiring a bench power supply of between 3.15 V and 26 V connected through the J2 and J4 connectors. The latest version of the configuration tool can be downloaded from the Analog Devices, Inc., website www.analog.com/powermonitorsw.

Note that, when changing devices, the software should first be shut down and the power supply to the board removed. J7 is an I^{2}C connector that connects the evaluation board to a PC via a 5-pin SMBus cable.

PACKAGE CONTENTS

ADM1191/ADM1192 evaluation board
5-pin SMBus cable
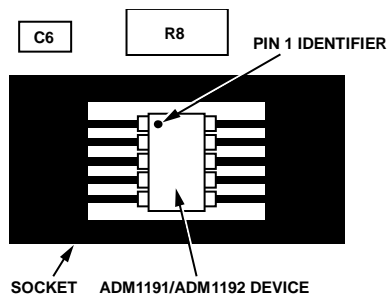**5-pin interconnection cable**
ADM1191/ADM1192 device samples

Figure 1. Sample Device Placement

EVAL-ADM1191/ADM1192

TABLE OF CONTENTS

REVISION HISTORY

5/08—Revision 0: Initial Version

EVALUATION BOARD HARDWARE

HARDWARE COMPONENTS

Main Evaluation Board

The evaluation board contains all of the circuitry necessary to simulate power monitoring events, such as a control FET, a sense resistor, and timing components. VR1 adjusts a variable load; turning VR1 clockwise reduces the load resistance, thereby increasing the load current to a maximum of 550 mA. The load circuit is useful when evaluating the performance of the device under varying load conditions.

5-Pin SMBus Cable

The 5-pin SMBus cable connects the main evaluation board to a standard PC through connector J7.

5-Pin Interconnection Cable

The interconnection cable is used for multiple evaluation board parallel connection setup. Two or more boards can be connected in parallel through the J1 and J5 connectors using the 5-pin interconnection cable. Each device should be assigned to a different address using an address pin. The maximum number of devices that can be interconnected is four for the ADM1192 and 16 for the ADM1191.

Device Samples

Some loose samples of the device to be evaluated are included in a samples box. A single device should be placed in the socket before powering up the evaluation board. The device should be oriented in the socket so that Pin 1 is in the top left corner, near C6, as shown in Figure 1.

SWITCH FUNCTIONS

Table 1.

Switch	Description	Default
S1	On Pin Setting Switch.	
S1-1	Connects the resistor dividers R5B, R5A/R6B, R6A to the CONV/SETV pin of the device.	Open
S1-2	Connects the resistor dividers R14B, R14A/R26B, R26A to the CONV/SETV pin of the device.	Closed
S2	Timer Adjust Capacitor. Sets current limit on time.	
S2-1	Connects the 4.7 nF capacitor (C1) to the SETV/TIMER pin.	Open
S2-2	Connects the 47 nF capacitor (C2) to the SETV/TIMER pin.	Closed
S2-3	Connects the 470 nF capacitor (C3) to the SETV/TIMER pin.	Open
S2-4	Connects the user-defined capacitors (C4 and C5) to the SETV/TIMER pin.	Open
S3	Additional Board Address Control Switch. Applies to the ADM1191.	
S3-1	Connects the A1 pin of the board to 3.3 V.	Open
S3-2	Pulls the A1 pin of the board to GND through a 150 k resistor.	Open
S3-3	Pulls the A1 pin of the board to GND.	Open
S3-4	N/C.	
S4	Board Address Control Switch.	
S4-1	Connects the A0/ADR pin of the board to 3.3 V.	Open
S4-2	Pulls the A0/ADR pin to GND through a 150 k resistor.	Open
S4-3	Pulls the A0/ADR pin to GND.	Open
S4-4	N/C.	
S5	Applies to the ADM1191 only; controls the CONV pin of the ADM1191. When depressed, the convert pin is high.	Closed
S6	Applies to the ADM1192 only; controls the CLRB pin of the ADM1192 device. When depressed, the CLRB pin is pulled low.	Closed
VR1	Adjusts a variable load; turning VR1 clockwise reduces the load resistance, thereby increasing the load current to a maximum of 550 mA.	N/A

JUMPER FUNCTIONS

Table 2.

Jumper	Description	Default
JP1	In Position A, the ALERTB pin of the ADM1191 is connected to the D5 LED circuitry.	A
	In Position B, the ALERTB pin of the ADM1191 is connected to J1-5, J5-5, and J7-5.	
JP2	In Position A, the CONV pin of the ADM1191 is connected to S5.	B
	In Position B, the CONV pin of the ADM1191 is connected to J5-4, J1-4, and J7-4.	
JP3	In Position A, the ALERTB pin of the ADM1192 is connected to the gate of FET Q1.	A
	In Position B, the ALERTB pin of the ADM1192 is connected to +3.3 V rail.	
JP4	In Position A, the ADM1192 ALERT output controls LED D1 (note that JP3 must be set to Position B).	B
	In Position B, the ADM1192 ALERT output is connected to J1-5, J5-5, and J7-5.	
JP5	When inserted, the output LED D4 circuitry is active.	Inserted
JP6	When inserted, the A1/CLRB pin is connected to S3 (ADM1191) or S6 (ADM1192).	Inserted
JP7	When inserted, the A0/ADR pin is connected to S4.	Inserted
J8	When in Position A, the SENSE pin of the device is connected to the source of FET Q1 (applies only to the ADM1192).	B
	In Position B, the SENSE pin of the device is connected to J10.	
J10	When in Position A, the drain of Q1 is connected to J3 (applies only to the ADM1192).	B
	When in Position B, the variable load circuit is active.	

LED FUNCTIONS

Table 3.

LED	Name	Description
D1	ALERT	Applies to the ADM1192. Indicates that an overcurrent condition has been detected; the level at which the overcurrent condition is detected depends on the voltage on the SETV pin. This can also be programmed digitally.
D3	INPUT	Indicates that the supply voltage is present.
D4	OUTPUT	Indicates that the output voltage is present.
D5	ALERTB	Applies to the ADM1191. Indicates that an overcurrent condition has been detected; the level at which the overcurrent condition is detected depends on the voltage on the SETV pin. This can also be programmed digitally.

LINKS AND CONNECTORS

Solder pads SL1 to SL13 are preset on the EVAL-ADM1191EBZ and the EVAL-ADM1192EBZ, with different settings for the devices they are designed to test. A board that is set up to test the ADM1191 device can be used later to test the ADM1192 device by changing the connections on the solder pad.

Table 4. Configuration Links Used to Configure an Evaluation Board for a Specific Device

Link	Description
SL1	Inserted for the ADM1191
SL2	Inserted for the ADM1192
SL3	Inserted for the ADM1191
SL4	Inserted for the ADM1192
SL5	Inserted for the ADM1192
SL6	Inserted for the ADM1191
SL7	Inserted with high current link
SL9	Inserted for the ADM1192
SL10	Inserted for the ADM1191
SL11	Inserted with high current link
SL12	Inserted for the ADM1191
SL13	Inserted for the ADM1192

Table 5. Connector Functions

Connector	Description
J1	Minimolex Connector. Used for interconnecting devices.
J2	Red Banana Connector. Input Voltage Line.
J3	Red Banana Connector. Output Voltage Line.
J4	Black Banana Connector. Ground.
J5	Minimolex Connector. Used for interconnecting devices.
J7	5-Pin Header. I²C Connector.
J9	Black Banana Connector. Ground.

EVALUATION BOARD SOFTWARE

For the ADM1191, measurements can be initiated by an I²C command or via the convert (CONV) pin. The CONV pin is especially useful for synchronizing reads on multiple ADM1191 devices. Up to 16 unique I²C addresses can be created, depending on the way the A0 and A1 pins are connected.

For the ADM1192, a CLRB pin is provided to clear fault conditions, and a timer pin is provided to time overcurrent conditions. Up to four unique I²C addresses can be created, depending on the way the ADR pin is connected.

POWERING THE EVALUATION BOARD

The evaluation board is powered using a bench supply of between 3.15 V and 26 V, connected to the J2 (VIN) and J4 (GND) connectors.

COMMUNICATING WITH THE EVALUATION BOARD

Communication with the ADM1191/ADM1192 devices is facilitated by the graphical user interface (GUI) provided by Analog Devices. The latest revision of this software is available for download at www.analog.com/powermonitorsw. The software is compatible with Windows® 2000 and Windows® XP.

Communication between a PC and the evaluation board is achieved through the 5-pin header (J7), which should be connected to the PC using the cable provided.
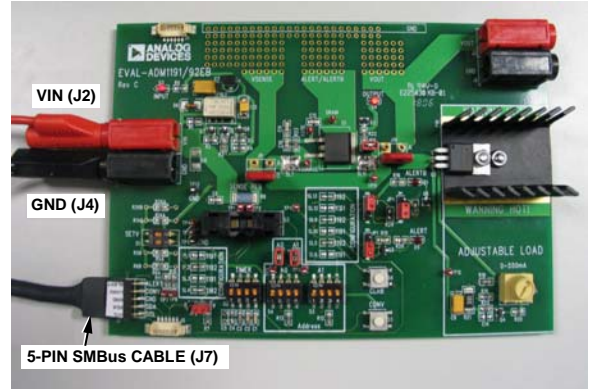

Figure 2. ADM1191/ADM1192 Evaluation Board

CONFIGURATION TOOL

The evaluation kit configuration tool allows you to program and monitor the many features of the ADM1191/ADM1192 current sense amplifiers through an intuitive GUI-based interface. With the evaluation kit, you can verify a configuration before using the ADM1191/ADM1192 in system applications.

The following minimum system requirements apply:

- Windows 2000
- 500 MHz processor
- 80 MB free disc space
- 256 MB RAM
- Minimum monitor resolution: 800 × 600 high color (16 bit).

The software interface is arranged in a tabbed format, each tab enabling the control of a key feature of the device.

INSTALLING THE EVALUATION SOFTWARE

Install the ADM1191/ADM1192 software as follows:

1. Download the .zip file containing the software from **www.analog.com/powermonitorsw**.
2. When the download is complete, extract the files from the .zip file.
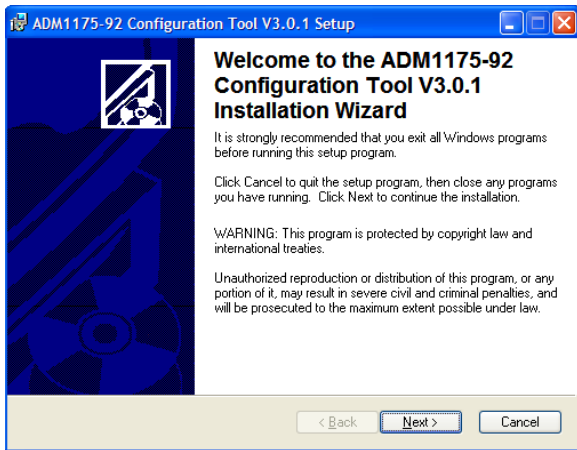3. Double-click **setup.exe**. The setup window appears.

Figure 3. Evaluation Software Installation Wizard

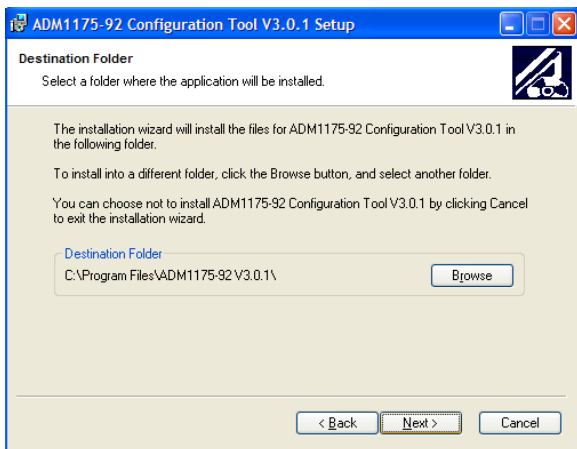4. Click **Next** to display the **Destination Folder** box.

Figure 4. Evaluation Software—Choosing a Destination Folder

5. To create a new destination folder, click **Browse**. If the default destination folder is acceptable, click **Next**. The following box appears:
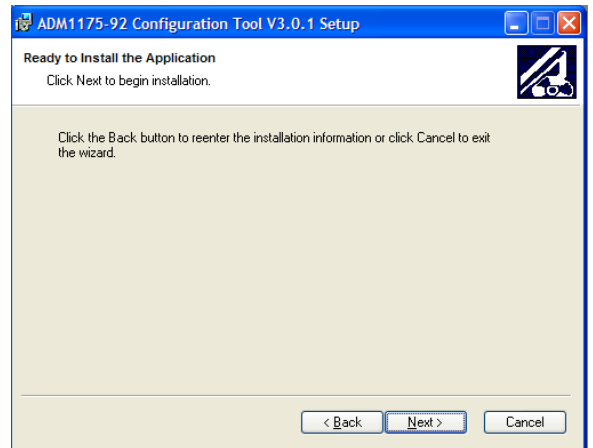

Figure 5. Installing the Evaluation Software

6. Choose to step back and reenter installation information, stop installation, or begin installation. To begin installation, click **Next**. The installation runs as shown in Figure 6.
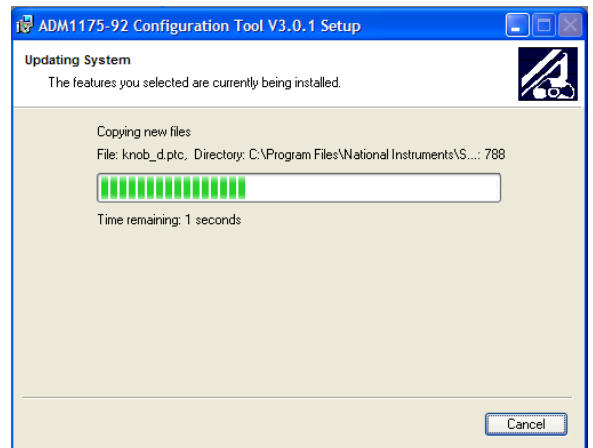

Figure 6. Installation in Progress

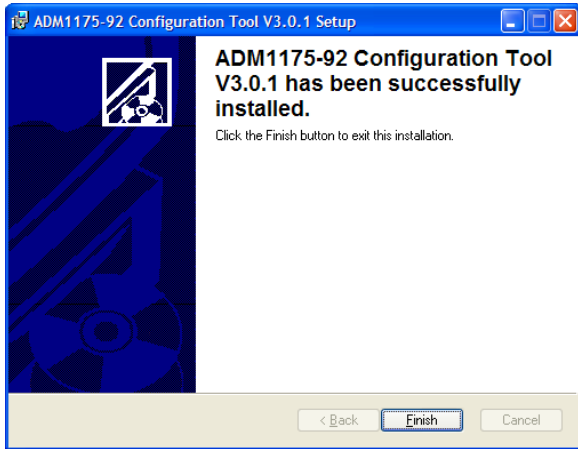7. When installation is complete, the following message box appears:

Figure 7. Evaluation Software—Installation Complete

8. Click **Finish**. The message shown in Figure 8 appears, indicating that you must restart the system for the configuration changes to take effect. Click **Yes** to restart the PC immediately; click **No** to manually restart later.
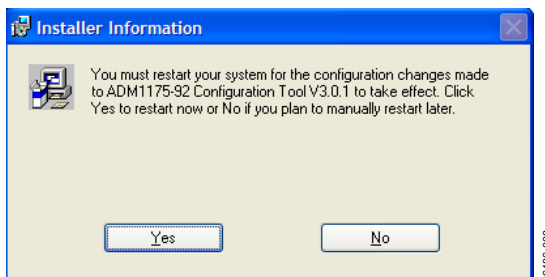

Figure 8. Installation Restart Reminder

UNINSTALLING THE EVALUATION SOFTWARE

Before an updated version of the evaluation software is installed, any previous version is uninstalled automatically after the newly downloaded **setup.exe** is double-clicked (see Step 3). The message shown in Figure 9 appears, notifying you that the previous version will be uninstalled.
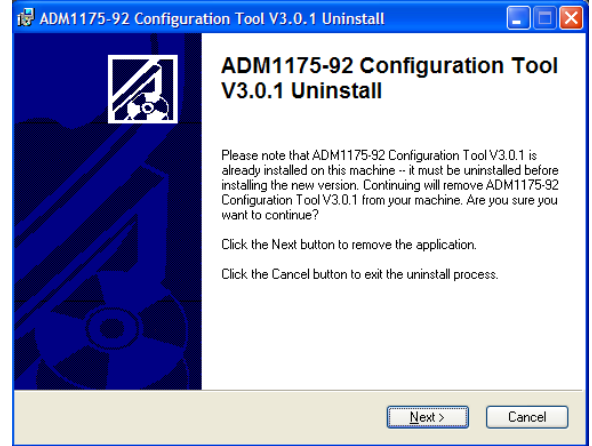

Figure 9. Evaluation Software—Uninstalling

When you click **Next**, the software uninstalls the software, providing status as it does so, and displays the following message to indicate that the previous version has successfully uninstalled:
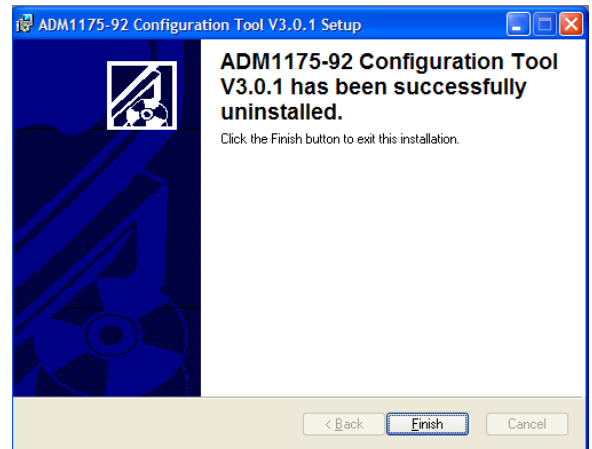

Figure 10. Evaluation Software—Uninstalling Complete

MANUALLY UNINSTALLING THE EVALUATION SOFTWARE

If you want to manually uninstall the ADM1191/ADM1192 software (without upgrading it to a newer version), do the following:

1. On the PC desktop, click **Start**.
2. Click **Control Panel**.
3. Click **Add or Remove Programs**.
4. Select the ADM1191 or ADM1192 program and click **Remove** to uninstall it.

USB–COMMUNICATING FOR THE FIRST TIME

When the evaluation board is launched for the first time using a USB connection, Windows does not recognize the external board and begins installing drivers automatically. To identify the USB converter to Windows, select the ADM1191/ADM1192 software and, when the box shown in Figure 11 appears, select **Install the software automatically (Recommended)**.
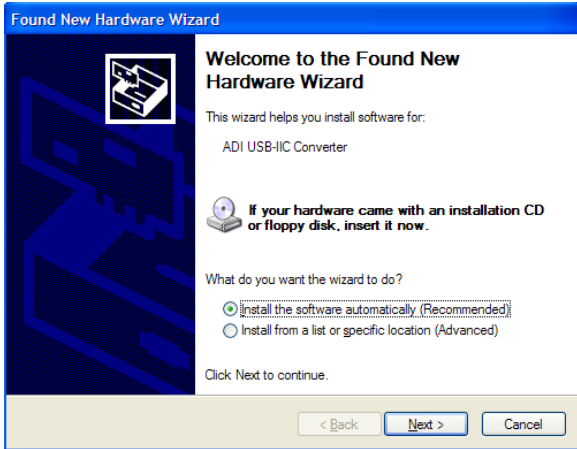

Figure 11. Automatically Installing Drivers for the Evaluation Board

In Windows XP, a warning is displayed indicating that the hardware has not passed Windows logo testing, which verifies compatibility with Windows XP. Because the evaluation board has been tested and is compatible with Windows XP, you can simply click **Contine Anyway** to install the necessary drivers as shown in Figure 12.
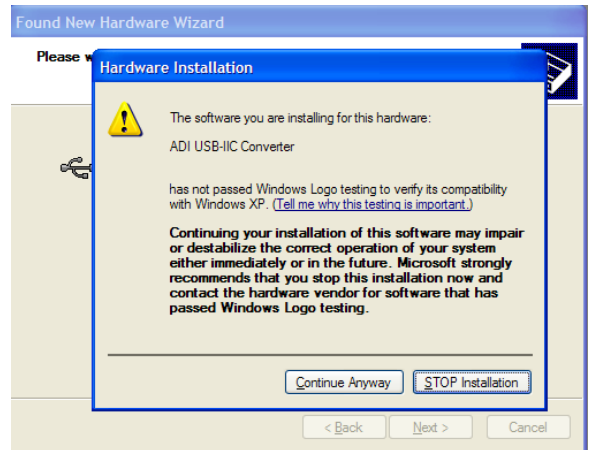

Figure 12. Windows XP Compatibility

After this process is complete, the message shown in Figure 13 appears. To close the installation wizard, click **Finish**. The software can now be opened again and run normally.

Figure 13. Completing Installation

STARTING THE EVALUATION SOFTWARE

1. Click **Start> All Programs> ADM1175-92 Configuration Tool 3.0.1> ADM1175-92 Configuration Tool 3.0.1** (note that the actual folder name is version dependent).

2. When the software starts, the software agreement window appears. Read the use conditions, select **I Agree** to agree with the conditions, and click **Continue**.
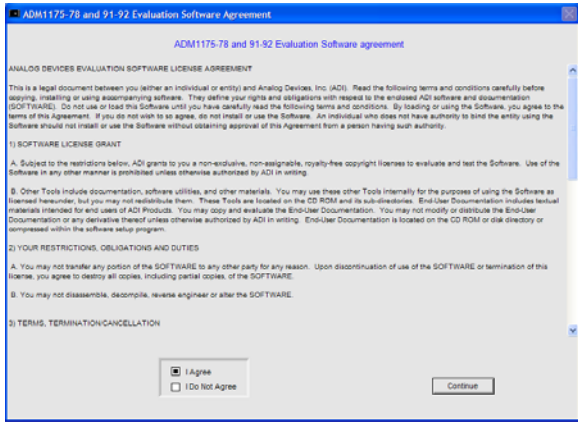

Figure 14. Software Agreement

If the evaluation board is powered up and an ADM1191/ADM1192 device is in the socket, the window shown in Figure 15 appears, displaying a green highlighted box that corresponds to the device I²C address.

As shown in Figure 15, there are four possible I²C addresses for the ADM1175, ADM1177, ADM1178, and ADM1192, while there are 16 possible I²C addresses for the ADM1176 and ADM1191. In Figure 15, an ADM1191 has responded with I²C address **7Eh**.
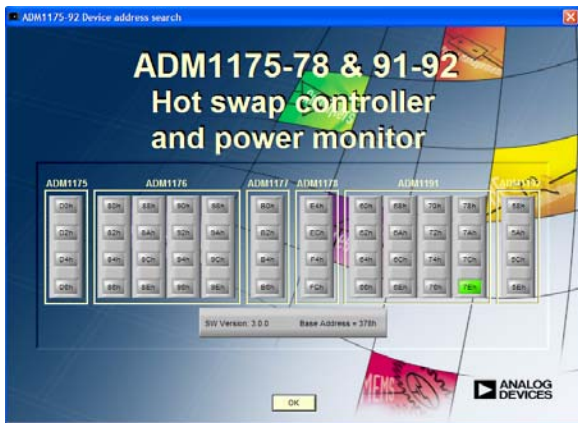

Figure 15. Device Address Detection Window

3. To continue, click **OK**.

The window shown in Figure 16 appears. In this example, you are prompted to accept the sense resistor value R_{SENSE} (R8). The default value of the sense resistor, R_{SENSE}, on the ADM1191/ADM1192 evaluation boards is 0.2 Ω.
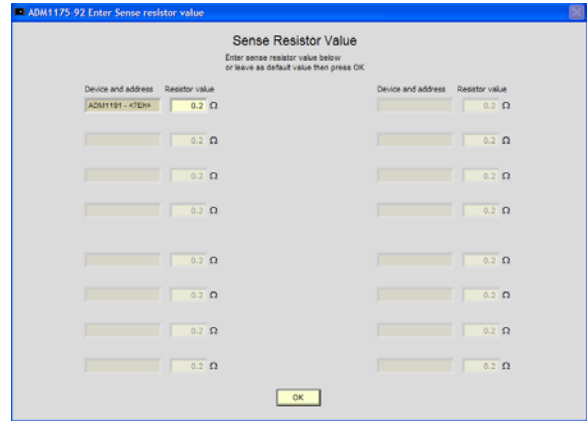

Figure 16. Sense Resistor Value Entry

4. Enter the value of the correct sense resistor and click **OK** to continue.

Note that related information on interconnecting devices can be found in the Evaluating Multiple Devices in Parallel section.

EVALUATION SOFTWARE—MAIN PANEL TAB

The **Main Panel** tab of the evaluation software is shown in Figure 17. It is divided into 10 control areas that you can use to test and evaluate the ADM1191/ADM1192 devices.
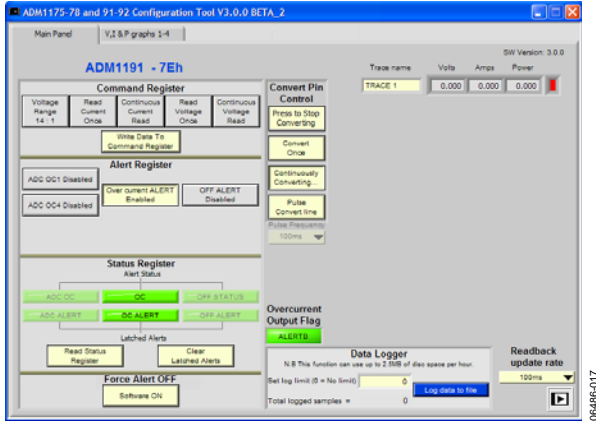

Figure 17. Main Panel Tab on the User Interface
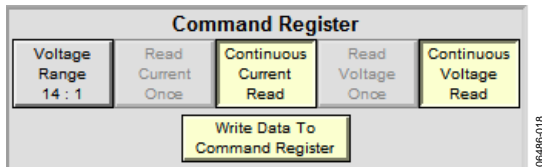
COMMAND REGISTER CONTROLS

Figure 18. Register Control Panel

Command Register controls allow you to manage the way in which the device reads the data. There are five toggle buttons with which to select the data reading method and voltage range. The voltage range is set at 14:1 by default (7:2 if the Range button is selected). You have the option of reading the current and voltage just once or continuously. Once you have selected the range and reading method, click **Write Data to Command Register** to pass the change to the register of the device.

Note that **Read Current Once** and **Continuous Current Read** cannot be selected simultaneously; the same rule applies to the voltage read buttons.
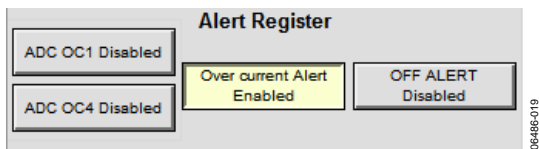
ALERT REGISTER CONTROLS

Figure 19. Alerts Panel

Alert Register controls consist of four buttons you can use to enable or disable the various alerts generated by the device being evaluated.

The four alert types are

- **ADC OC1 (**analog-to-digital converter overcurrent Alert 1): When you enable this alert, a message box appears prompting you to enter the current limit that triggers the alert. When you set the sense resistor to the default value 0.2 Ω, the range is 0 to 0.529 A. If a lower value sense resistor is used, the range increases; similarly, if a higher value is used, the range is reduced.

  Press **Enter** after entering the value to set it. The ADC overcurrent alert is then triggered when a current greater than the specified level is detected by a single ADC sample.
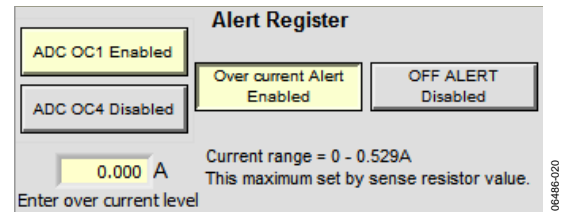

Figure 20. Analog to Digital Converter Overcurrent Alert 1

- **ADC OC4 (**analog-to-digital converter overcurrent Alert 4): The ADC OC4 alert is similar to the ADC OC1 alert except that it triggers only if a current greater than the specified level is detected for four consecutive ADC samples. This prevents a single transient event from triggering an ADC overcurrent condition.
- **Over current Alert:** This alert is enabled when an over-current condition is present.
- **OFF ALERT:** This alert enables the Software Off Alert.

By default, the overcurrent alert is enabled when **ADC OC1**, **ADC OC4**, and **OFF ALERT** are disabled. An enabled alert is highlighted in yellow; a disabled alert is gray in color. To enable or disable an alert, simply select the corresponding button in the **Alert Register**.
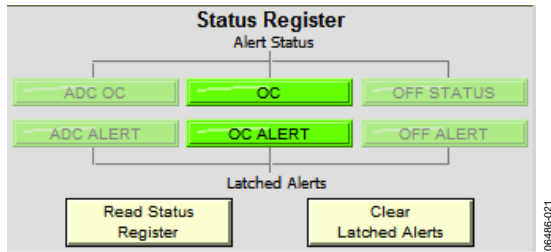
STATUS REGISTER CONTROLS

Figure 21. Status Register

Status Register controls monitor the following alert types:

- ADC overcurrent alert
- Overcurrent alert
- Software off alert

The status register panel has six alert indicators. The upper row shows the real-time alert status, while the lower row shows the latched alert status. Each type of alert can be enabled or disabled with **Alert Register** controls, as discussed in the Alert Register Controls section.

To read the alert status, click **Read Status Register**. If the color of an alert indicator turns from green to red, it indicates that the alert has been triggered.

To clear latched alerts, click **Clear Latched Alerts** and then click **Read Status Register**.
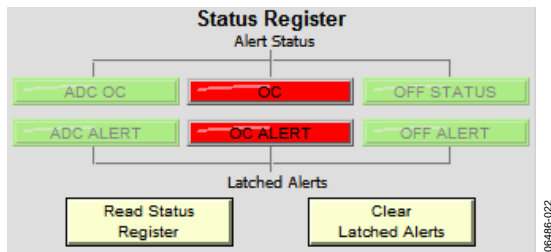

Figure 22. Status Register Showing Triggered Alerts

When the overcurrent alert is triggered, as shown in Figure 22, the device goes into overcurrent protection mode. To restart the board, cycle the power or toggle the ON pin of the device or the software ON bit.
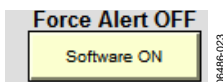
FORCE ALERT OFF CONTROL

Figure 23. Software On/Off Switch

The **Force Alert OFF** control manually overrides the ALERT/ALERTB output. The off status alert triggers when the software turns off, and the **OFF STATUS** control turns from green to red in the **Status Register** control panel.

OVERCURRENT OUTPUT FLAG

To the right of the **Status Register** controls, there is an indicator called the **Overcurrent Output Flag**. For the ADM1191, it is labeled **ALERTB**, while for the ADM1192, it is labeled **ALERT**. This indicator updates in real time. If an overcurrent condition is detected, the indicator changes from green to red.

Figure 24. ADM1191 Overcurrent Output Flag

Figure 25. ADM1192 Overcurrent Output Flag

When the overcurrent condition is removed, the indicator changes to green after **Read Status Register** in the **Status Register** panel is selected.

Note that the positions of Jumper JP1 for the ADM1191 and Jumper JP4 for the ADM1192 on the evaluation board affect the status of this indicator. When the appropriate jumper is inserted in Position A on the board, the **Overcurrent Output Flag** is represented by the on-board LEDs, and the indicator in the software is constantly green, even when an overcurrent event occurs.

TRACE DATA DISPLAY CONTROLS
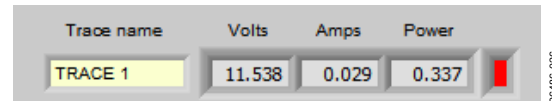
Figure 26. Trace Data Display

The trace data display area displays the digitized current, voltage, and power data. You have the option of changing the name of the trace using the **Trace name** box. The color box to the right of the **Power** box indicates the color with which the trace is plotted on the voltage, current, and power (**V, I & P graphs**) tab.

When the software is supporting multiple board connections, multiple traces appear. For more information, see the Evaluating Multiple Devices in Parallel section.

READBACK UPDATE RATE CONTROL

Figure 27. Readback Update Rate Options

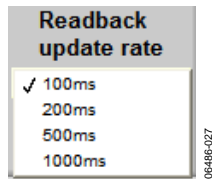The readback update rate is set using the **Readback update rate** control box shown in Figure 27. You can choose from four update options: every 100 ms, 200 ms, 500 ms, and 1000 ms. Each option changes the rate at which the data in the trace data display area is updated. The readback update rate also sets the rate for data display in the **Data Logger** and the real-time graphs on the **V, I & P graph**s tab.
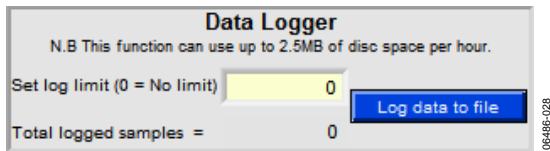
DATA LOGGER

Figure 28. Data Logger Panel

Data Logger controls allow you to log the digitized data that is collected to a Microsoft Excel® format file, giving you more flexibility to monitor and compare data. You must set up the data sampling rules. Enter the number of times to perform a sample in the **Set log limit** box. If this value is zero, there is no limit on the number of samples the data logger can log.

The sampling rate is set using one of the four options in the **Readback update rate** box. In Figure 29, the data logger logs 100 samples, with 100 ms between each sample.
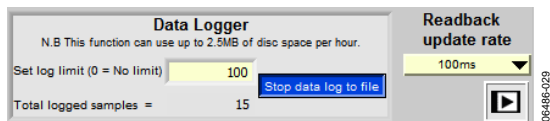

Figure 29. Data Logging

After you set up the data logger, click **Log data to file**. A file browser box appears so that you can specify a file name and location for storing the data. In the box, click **Log** to start logging data to the file. The data is sampled at the chosen rate and logged to the selected Excel file.

After the data begins logging, the total number of samples logged is displayed at the bottom of the **Data Logger** area. This number increases with the sampling rate. The log progress is complete when it reaches the log limit value. Alternatively, you can click **Stop data log to file** to terminate the process. After the data is imported to the Excel file you specify, the data can be easily evaluated.
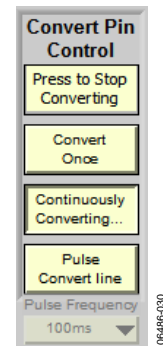
CONVERT PIN CONTROL

Figure 30. Convert Pin Control (ADM1191 Only)

The **Convert Pin Control** options apply to the ADM1191 device only. You can use these options to control the analog-to-digital conversion of voltage and current.

Jumper JP2 should be in Position B to allow the evaluation software to control the convert pin. If the jumper is in Position B, the on-board switch S6 can be used to control the conversion.

The four options on the panel control the type of data conversion carried out.

- **Press to Stop Converting** allows you to stop a continuous conversion.
- **Convert Once** carries out a single conversion by issuing a single pulse to the CONV pin. The result of the conversion appears in the trace data display area at the top right of the **Main Panel** tab.
- **Continuously Converting** begins a continuous conversion by pulling the CONV pin high. The results of the continuous conversion are displayed in the trace data display area.
- **Pulse Convert line** controls pulse frequency, as shown in Figure 31. You can choose from one of four pulse frequencies: 100 ms, 200 ms, 500 ms, and 1000 ms.
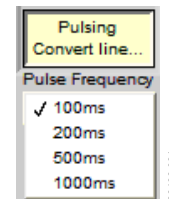

Figure 31. Pulse Frequency Selection

Note that, if you set the pulse frequency for the ADM1191, you will not be able to change the readback update rate.

COMMUNICATION STATUS INDICATOR

At the lower right corner of the **Main Panel** tab, there is a communication status indicator that reports the status of the connection between the software and the evaluation board. There are three possible indicators, as shown in Figure 32.

Figure 32. Device Communication Indicator

The leftmost indicator reports normal communication. The middle indicator spins to report a write data to register. The third indicator reports that communication between the device and the user interface has been lost. The software should be restarted to reestablish communication with the device.

REAL-TIME GRAPHS OF VOLTAGE, CURRENT, AND POWER

On the **V, I & P graphs** tab, you can monitor data collected through the evaluation board using the software generated graphs. On the tab, there are three sets of controls and graphs corresponding to voltage, current, and power. Voltage and current graphs are displayed using actual voltage and current data from the device. The values for the power graph are calculated using P = V.I.
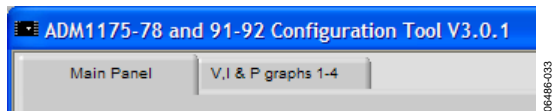

Figure 33. Panel Selection Tabs

The **Readback update rate** control on the **Main Panel** tab sets the rate at which the ADC samples are taken and, consequently, the speed at which the graphs update.
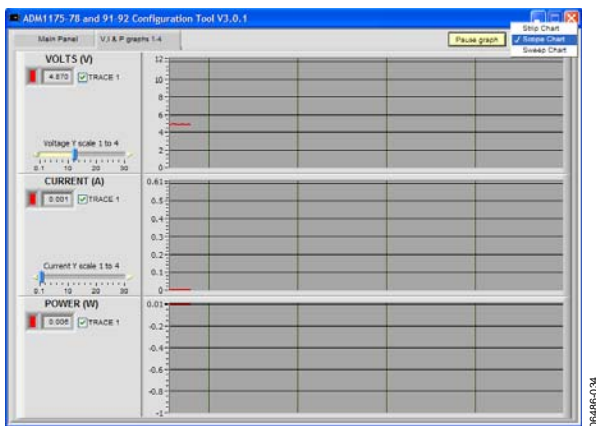

Figure 34. Voltage, Current, and Power Plot

The digitized values for voltage, current, and power are displayed at the left in each set of controls and graphs.

Figure 35. Trace Identifier

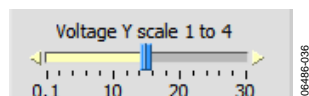For ease of viewing, you can scale the y-axis of a plot.

Figure 36. Scale Adjustment Bar

At the top right corner of the tab, there is a **Pause** button that you can use to pause the graph from real-time plotting. There is also a chart selection box that you can use to choose a graph

format. The options are **Strip Chart**, **Scope Chart**, and **Sweep Chart**. The default is **Scope Chart**.
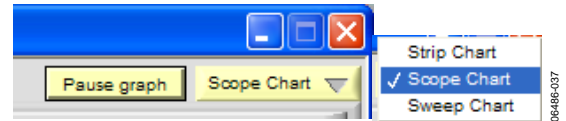
Figure 37. Pause Graph and Chart Type Selection

Figure 38 shows the result of varying the supply voltage. Note that the power graph also changes.
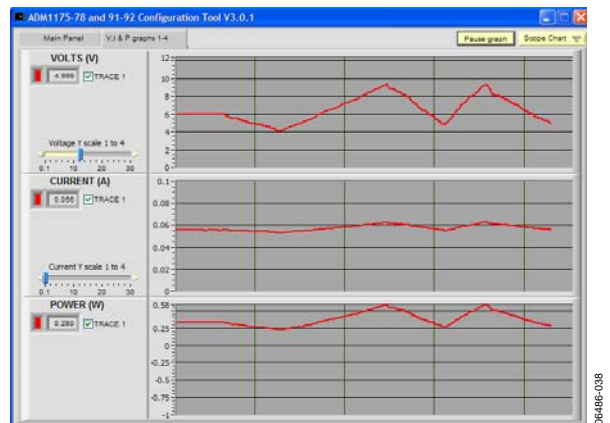
Figure 38. Plot with Voltage Variation

Figure 39 shows that the supply voltage is constant but that the current is changing as a result of varying the load resistance by turning switch VR1. Turning VR1 clockwise reduces the load resistance, thereby increasing the current; turning VR1 counterclockwise has the opposite effect. Again, notice the variation in the power graph as the current graph changes.

Figure 39. Plot with Current Variation

EVALUATING MULTIPLE DEVICES IN PARALLEL

For the ADM1191, up to 16 unique I²C addresses can be created, allowing you to interconnect up to 16 devices. For the ADM1192, up to four I²C addresses can be created, allowing you to interconnect up to four ADM1192 devices.

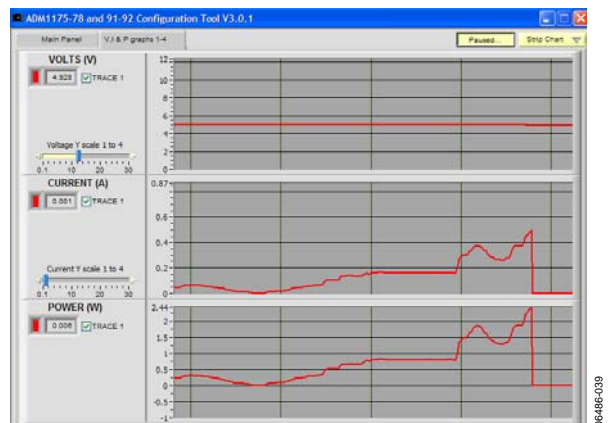Each evaluation board is fitted with switches labeled A0 and A1. A0 is used on an ADM1192 device to assign an address, via the ADR pin, to that particular device. For the ADM1191, both A0 and A1 are used to assign up to 16 I²C addresses. You must ensure that each device has a unique I²C address.

When interconnecting ADM1191/ADM1192 devices, you should power each device using a bench supply of between 3.15 V and 26 V, connected to J2 (VIN) and J4 (GND).

The first evaluation board should be connected to the PC parallel port using a 5-pin SMBus cable from the 5-pin header labeled J7. Each board is fitted with two Minimolex connectors, J1 and J5. To interconnect multiple boards, use the red 5-pin Minimolex cables provided.

COMMUNICATING WITH INTERCONNECTED ADM1191/ADM1192 EVALUATION BOARDS

Figure 40 displays the result of the device address search when two ADM1191s, one ADM1192, and one ADM1176 are cascaded. Note that the I²C addresses of the four devices are highlighted in green.
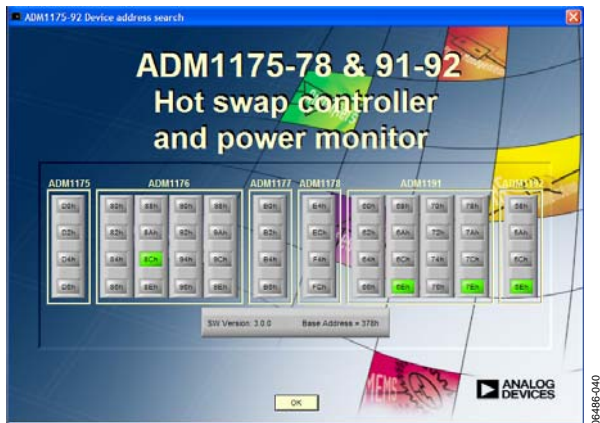
Figure 40. Device Address Search for Four Interconnected ADM1191/ADM1192 Devices

After you click **OK**, the window shown in Figure 41 appears, prompting you to enter the value of the current sense resistors. The default value of the sense Resistor, R8, is 0.2 Ω.
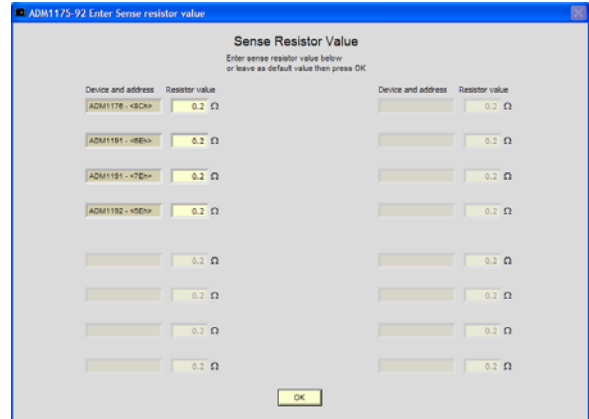
Figure 41. Sense Resistor Value Input Panel for Multiple Devices

Click **OK** to proceed. The evaluation software **Main Panel** tab appears.
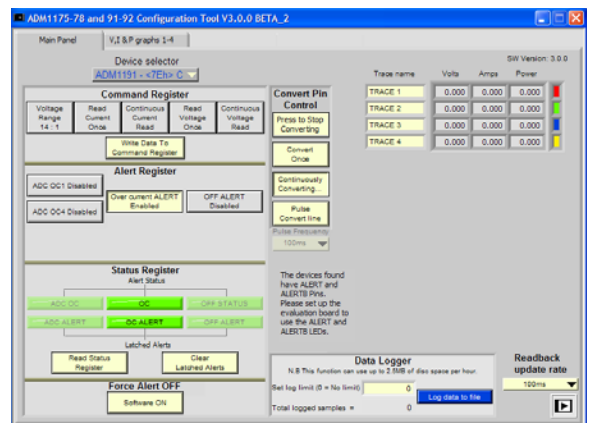
Figure 42. Main Panel for Multiple Devices

Note the **Device selector** drop-down box at the top of the tab.
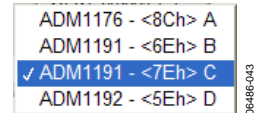
Figure 43. Multidevice Selector

You can use this box to select each device and select the config-uration settings for that device. After you select the range and reading methods, click **Write Data to Command Register** in the **Command Register** control panel to pass the changes to the device register.

You can view the voltage, current, and power graphs on the **V, I & P graphs** tab.
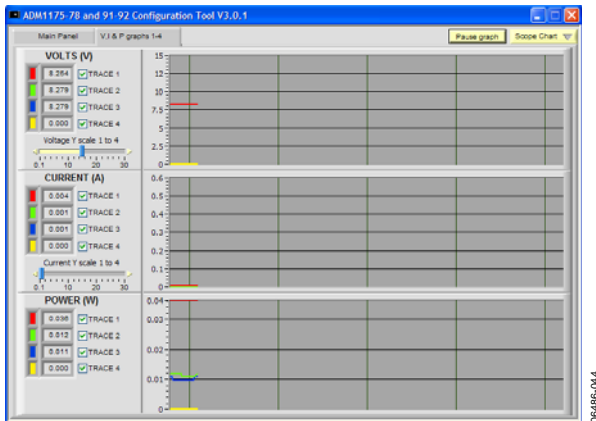
Figure 44. Voltage, Current, and Power Plot for Multiple Devices

The digitized values for voltage, current. and power are displayed at the left in each set of controls and graphs. You can select the traces to view by clicking the box to the left of each trace name. You can also scale the y-axis of the plots for easy viewing.

Figure 45 depicts the result of altering the input voltage. Note the corresponding change on the power graph.
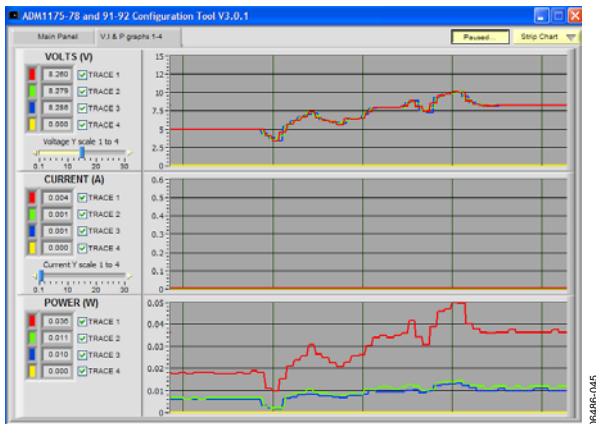
Figure 45. Plot with Voltage Variation for Multiple Devices

As shown in Figure 45, the supply voltage is constant and the current associated with traces is varied. The current is changed by changing the load resistance. Turning VR1 clockwise on each evaluation board reduces the load resistance, thereby increasing the current, and turning VR1 counterclockwise increases the load resistance and, thus, reduces the current.
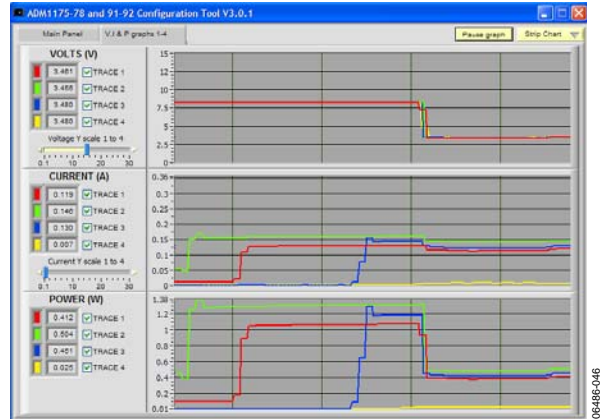
Figure 46. Multidevice Plot with Current Variation

If more than four boards are interconnected, there are additional tabs for the voltage, current, and power graphs. As shown in Figure 47, four traces are displayed in each graph, up to a maximum of 16 traces on four graph tabs when 16 ADM1191 devices are set up in parallel.
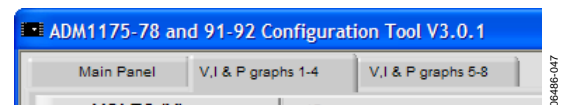
Figure 47. Multidevice Panel Selection Tab
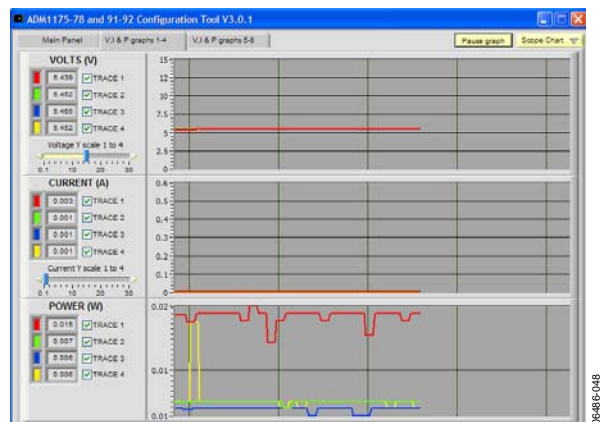
Figure 48. Multidevice Plotting Screen for Device 1 Through Device 4

INTERCONNECTING A COMBINATION OF ADM1191 AND ADM1192 DEVICES

ALERT/ALERTB output is not supported by the evaluation tool when a combination of ADM1191 and ADM1192 devices is interconnected. This is because the ADM1191 and ADM1192 have alert outputs with opposing polarity (ALERTB and ALERT), and these output flags cannot be supported as a single logic signal via J7 through J5 to the PC.
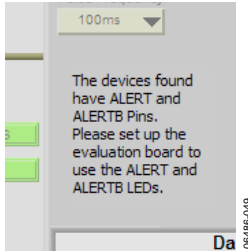
Figure 49. Overcurrent Flag Indicator for Interconnected Devices with ALERT and ALERTB Output

The **Main Panel** tab of the configuration tool has a different appearance in this situation. To the right of **Status Register**, there is no **Overcurrent Output Flag** for either the ADM1191 or the ADM1192 device.

Note that the **Overcurrent Output Flag** appears when ADM1178 and ADM1191 devices are interconnected. The reason is that both devices have the ALERTB type output.

Therefore, when interconnecting a combination of ADM1191 and ADM1192 devices, it is recommended that you use the LEDs on the evaluation board that correspond to ALERT (D1) and ALERTB (D5) to give a hardware alert. When an over-current condition is detected, the corresponding LED lights up.

To configure the evaluation board to give a hardware alert for ALERT/ALERTB, position the jumpers as shown in Table 6.

Table 6. Jumper Positions for ALERT/ALERTB

Device	Jumper
ADM1191	JP1 Position A
ADM1192	JP3 Position B
ADM1192	JP4 Position A

Note that, if an overcurrent condition occurs for the ADM1192, you can press the on-board CLRB button to clear the alert after the overcurrent condition is eliminated. This does not apply to the ADM1191.

EVALUATION BOARD SCHEMATIC

Figure 50.

ORDERING INFORMATION

BILL OF MATERIALS

Table 7.

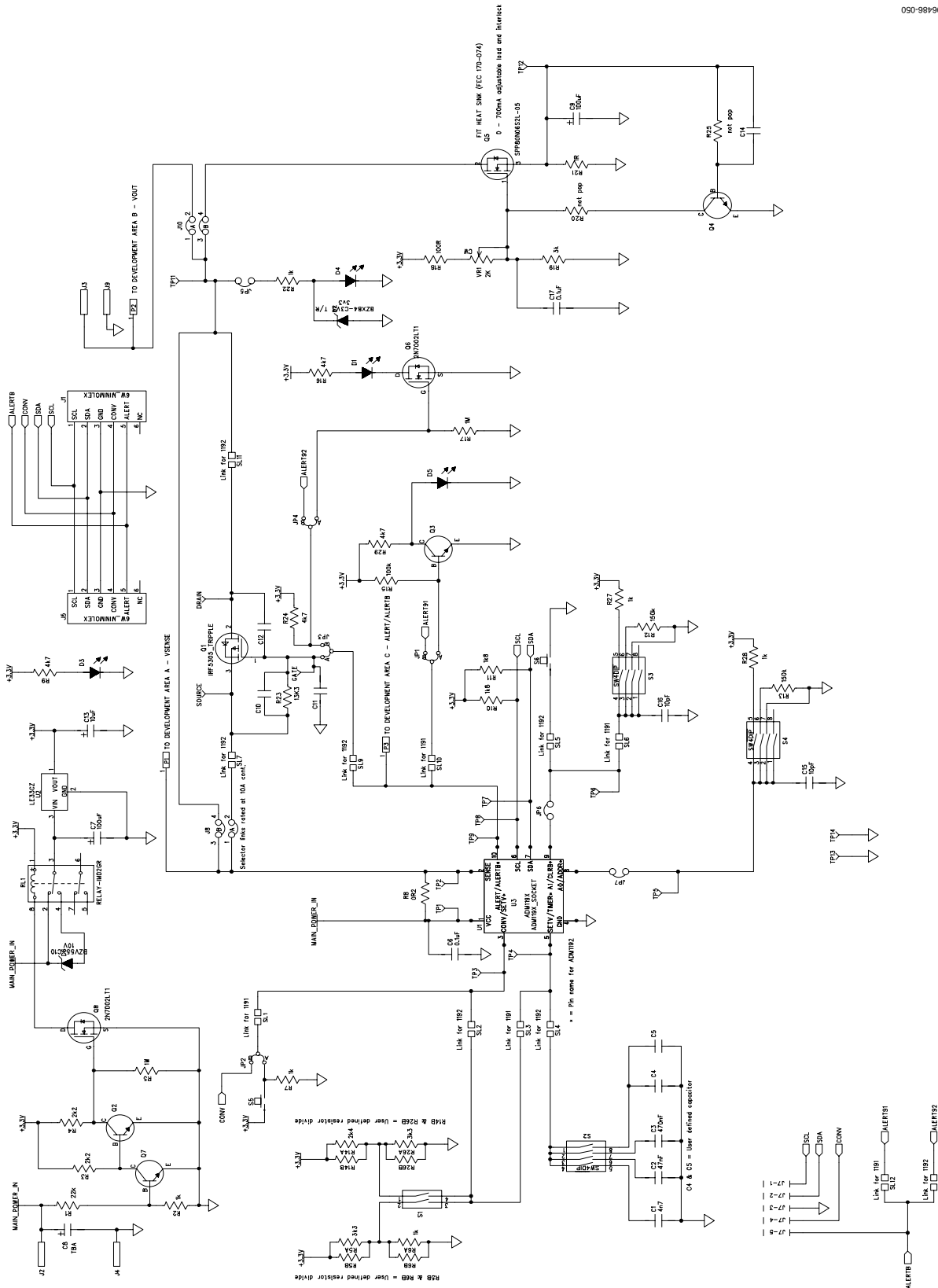| Qty	Reference Designator	Description	Manufacturer	Manufacturer Number	Supplier Number[1]
1	C1	4.7 nF, 10%, 0805, multilayer ceramic capacitor	Phycomp	2238 580 15632	FEC 3019913
1	C2	47 nF, 10%, 0805, multilayer ceramic capacitor	Phycomp	2238 580 15645	FEC 718683
1	C3	470 nF, 10%, 0805, multilayer ceramic capacitor	Multicomp	B0805R474KCT	FEC 9406336
2	C4, C5	User-defined capacitor			
5	C6, C10, C11, C12, C17	0.1µF, 10%, 0805, multilayer ceramic capacitor	Multicomp	U0805R104KCT	FEC 9406387
1	C7	10 µF, 10%, CAP\TAJ_D, 35 V Tantalum capacitor	Kemet	T495D106K035ATE300	FEC 9229248
1	C9	100 µF, 10%, CAP\TAJ_C, 10 V Tantalum capacitor	AVX	TAJC107K010R	FEC 197180
1	C13	10 µF, 10%, CAP\TAJ_A, 10 V Tantalum capacitor	AVX	TPSA106K010R1800	FEC 1135105
2	C15, C16	10 pF, 5%, 0603, multilayer ceramic capacitor	Epcos	B37930K5100J60	FEC 9753478
4	D1, D3, D4, D5	LED-0805, red SMD LED	Avago	HLMP-6000-E0011	FEC 1003354
1	D2	3.3 V, 5%, SOT23, Zener diode	Philips	BZX84-C3V3 T/R	FEC 1081419
1	D6	10 V, DIODE-SMB, Zener diode	Philips	BZV55-C10	FEC 1081361
2	J1, J5	MOLEX53398-0671, 6-way SMD straight mini header	Molex	533980671–Molex	FEC 1125368
2	J2, J3	Red 4 mm banana	Deltron	571-0500-01	FEC 1101127
1	J7	MOLEX, 5-way right angle header	Molex	22-12-2054	FEC 3116890
2	J8, J10	PCB_SELECTOR_PLUGS_DIP4, 4-pin (2 x 2) shorting and socket	Harwin	D3086-98 & H3161-01/ D3086-98	FEC 149318/ 149306
2	J9, J4	Black 4 mm banana socket	Deltron	571-0100-01	FEC 1101128
7	JP1, JP2, JP3, JP4, JP5, JP6, JP7	LINK-3P, 3-pin (0.1" pitch) header and jumper socket	Harwin	M20-9990346/ M7566-05	FEC 1022249/ 150411
1	P10	TO220 heat sink	AAVID Thermalloy	TV40	FEC 170074
1	Q1	IRFR_U3910_TRIPLE_FOOTPRINT, MOSFET, P, D2-PAK	Vishay	SUB65P06-20	FEC 9551395
4	Q2, Q3, Q4, Q7	BC849BLT1G, SOT23, NPN small signal transistor	On Semiconductor	BC849BLT1G	FEC 9558616
1	Q5	TO-220_EXPOSED_PAD_HEATSINK, MOSFET, N logic	Fairchild	FDP7030BL	FEC 9845151
2	Q6, Q8	SOT23, N-channel, enhancement mode, TMOSFET	Fairchild	NDS7002A	FEC 9845437
1	R1	22 kΩ, 1%, 0805, SMD resistor	Multicomp	MC 0.1W 0805 1% 22K	FEC 9332820
9	R2, R6A, R7, R9, R22, R25, R27, R28, R29	1 kΩ, %, 0805, SMD resistor	Multicomp	MC 0.1W 0805 1% 1K	FEC 9332383
2	R3, R4	2.2 kΩ, 1%, 0805, SMD resistor	Multicomp	MC 0.1W 0805 1% 2K2	FEC 9332812
1	R5	1 MΩ, 1%, 0805, SMD resistor	Multicomp	MC 0.1W 0805 1% 1M	FEC 9332413
1	R5A	3.3 kΩ, 1%, 0805, SMD resistor	Multicomp	MC 0.1W 0805 1% 3K3	FEC 9333045
1	R8	0.2 Ω, 1%, 2512, current sense SMD resistor	Welwyn	LR2512-R20FW	FEC 1100068
2	R10, R11	1.8 kΩ, 0805, SMD resistor	Multicomp	MC 0.1W 0805 1% 1K8	FEC 9332715
2	R12, R13	150 kΩ, 1%, 0805, SMD resistor	Multicomp	MC 0.1W 0805 1% 150K	FEC 9332626

Qty	Reference Designator	Description	Manufacturer	Manufacturer Number	Supplier Number[1]
1	R14A	2.4 kΩ, 1%, 0805, SMD resistor	Multicomp	MC 0.1W 0805 1% 2K4	FEC 9332880
2	R15, R17	100 kΩ, 1%, 0805, SMD resistor	Multicomp	MC 0.1W 0805 1% 100K	FEC 9332405
1	R16	510 Ω 1%, 0805, SMD resistor	Multicomp	MC 0.1W 0805 1% 510R	FEC 9333312
1	R18	100 Ω 1%, 0805, SMD resistor	Multicomp	MC 0.1W 0805 1% 100R	FEC 9332375
1	R19	3 kΩ,1%, 0805, SMD resistor	Multicomp	MC 0.1W 0805 1% 3K	FEC 9332995
1	R20	10 Ω, 1%, 0805, SMD resistor	Multicomp	MC 0.1W 0805 1% 10R	FEC 4762113
1	R21	1 Ω, 5, 0805, SMD resistor	Phycomp	232276260108	FEC 9235833
1	R23	13.3 kΩ, 5, SMD resistor	Yageo	RC0805FR-0713K3L	Digikey 311-13.3KCRCT-ND
1	R24	47 kΩ, 0805, SMD resistor	Multicomp	MC 0.1W 0805 1% 47K	FEC 9333274
1	R26A	3.3 Ω, 1%, 0805, SMD resistor	Multicomp	MC 0.1W 0805 1% 3K3	FEC 9333096
1	RL1	RELAY-IM02GR, SMD DPCO 4.5VDC, relay	Tyco	IM02GR	FEC 4148344
1	S1	SW\2_DIP_SMD, DIP4_SMD, 2-way SMD switch	Omron	A6S-2102	FEC 9901850
3	S2, S3, S4	SW\4DIP, DIP8_SMD, 4-way SMD switch	Omron	A6S-4101	FEC 9901868
2	S5, S6	SW-PUSH-SMD, SW_PB_SMD_6MM, SMD push button switch (sealed)	Omron	B3S-1000	FEC 177807
13	DRAIN, GATE, SOURCE, TP1, TP2, TP3, TP4, TP5, TP6, TP7, TP8, TP11, TP12	Red testpoint	Vero	20-313137	FEC 8731144
2	TP13, TP14	Black testpoint	Vero	20-2137	FEC 8731128
1	U1	MSO10	Analog Devices	ADM1191ARMZ/ ADM1192ARMZ	
1	U2	TO-92C, 3.3 V regulator	STMicroelectronics	LE33CZ	FEC 9755349
1	U3	MSO10-SKT, 10-pin MSOP socket	Wells	656-0102211	Abrel Products 656-0102211
1	VR1	VRES_ROTARY, trimmer pot	Vishay Spectrol	63M-T607-202	FEC 9608214
4	R5B, R6B, R14B, R26B	User-defined resistor			
4		Stick-on feet	3M		FEC 148-922

[1] FEC indicates the Farnell Electronic Components company.

ORDERING GUIDE

Model	Description
EVAL-ADM1191EBZ[1]	ADM1191 Evaluation Board
EVAL-ADM1192EBZ[1]	ADM1192 Evaluation Board
CABLE-SMBUS-5PINZ[1]	5-Pin SMBus Cable (Parallel Port)
USB-5PSMBUS-CABLEZ[1]	5-Pin SMBus Cable (USB Port)

[1] Z = RoHS Compliant Part.

ESD CAUTION

ESD (electrostatic discharge) sensitive device. Charged devices and circuit boards can discharge without detection. Although this product features patented or proprietary protection circuitry, damage may occur on devices subjected to high energy ESD. Therefore, proper ESD precautions should be taken to avoid performance degradation or loss of functionality.

NOTES

NOTES

NOTES

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