TMP107EVM User's Guide

This user's guide describes the characteristics, operation, and use of the TMP107EVM evaluation module. This user guide discusses how to set up and configure the software and hardware, and reviews various aspects of the program operation. Throughout this document, the terms *evaluation board*, *evaluation module*, and *EVM* are synonymous with the TMP107EVM. This document also includes an electrical schematic, printed circuit board (PCB) layout drawings, and a parts list for the EVM.

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Contents

List of Figures

List of Tables

1 Overview

The TMP107 is a ±0.5°C temperature sensor with a one-wire SMAART wire™ interface, electrically-erasable programmable memory (EEPROM), and an alert function. The TMP107 uses a one-wire interface that works with the universal asynchronous receiver/transmitter (UART) protocol, thus making the device ideal for many applications. The TMP107EVM is a platform for evaluating the performance of the TMP107 under various conditions. The TMP107EVM consists of several components, the first is the TMP107EVM motherboard that communicates with the computer, provides power, and sends and receives appropriate digital signals. The second component is the three-conductor cable that contains three TMP107 devices on adaptor boards (also termed *coupon boards*) in a daisy-chain configuration.

1.1 TMP107EVM Kit Contents

Table 1 summarizes the contents of the TMP107EVM kit. Figure 1 shows the included hardware. Contact the Texas Instruments Product Information Center nearest you if any component is missing. It is highly recommended that you also check the TMP107 product folder on the TI web site at www.ti.com to verify you have the latest versions of the released software.

Table 1. TMP107EVM Kit Contents

Item	Quantity
TMP107EVM motherboard	1
Three-conductor cable with three TMP107 adaptor boards	1
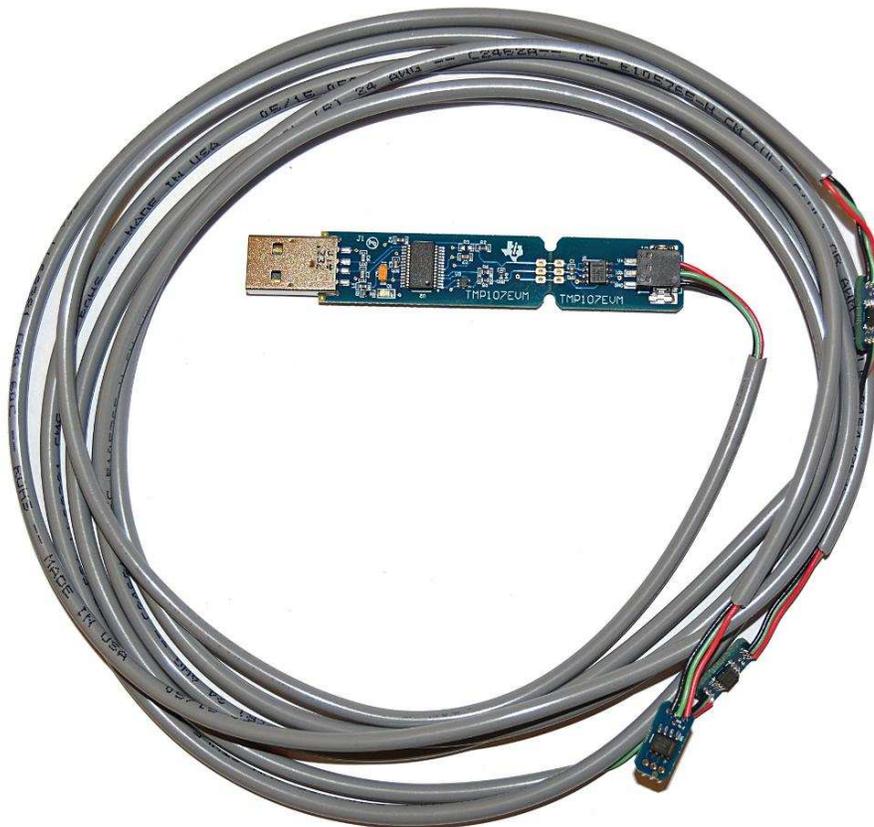
Figure 1. Hardware Included with the TMP107EVM Kit

1.2 Related Documentation from Texas Instruments

The following document provides information regarding Texas Instruments' integrated circuits used in the assembly of the TMP107EVM. This user's guide is available from the TI web site under literature number SBOU158. Any letter appended to the literature number corresponds to the document revision that is current at the time of the writing of this document. The latest revision can be found by clicking the link in Table 2 and is also available from the TI web site, the Texas Instruments' Literature Response Center at (800) 477-8924, and the Product Information Center at (972) 644-5580. When ordering, identify the document by both title and literature number.

Table 2. Related Documentation

Document	Literature Number
TMP107 product data sheet	SBOS716

2 Quick-Start Setup and Use

Follow these steps to set up and use the TMP107EVM:

1. Download and install the Virtual Com Port drivers from www.ftdichip.com/Drivers/VCP.htm.

2. Download and install the TMP107EVM graphical user interface (GUI) software from www.ti.com/tool/TMP107EVM.

3. If not already connected, attach the three-conductor cable to J2; see Figure 4.

4. Insert J1 into an open USB port on the computer with the software and drivers installed.

5. Select the Com Port from the *Serial Port* drop-down box associated with the TMP107EVM and click the **Initialize System** button. When the *Number of Devices* field shows the appropriate number of devices in the daisy chain (4, if the default hardware included in the TMP107EVM kit is used) and the lower right field of the status bar reads *CONNECTED* in green, select the *Global Device* tab from the *Pages* sidebar.

6. Push the **Global Run Continuous** button to start capturing the temperature of all TMP107 devices in the daisy-chain and to display those measurements in the *Temperature Array ⁰C* field and in the *Global Temperature Plots* waveform chart.

3   TMP107EVM Hardware

The TMP107EVM provides basic functional evaluation of the TMP107. The fixture layout is not intended to be a model for the target circuit and is not laid out for electromagnetic compatibility (EMC) testing.

A block diagram of the TMP107EVM system setup is shown in Figure 2. The TMP107EVM PCBs have the following features:

- The TMP107EVM motherboard has a convenient 0.6" × 3" USB stick form factor.
- The option to easily and impermanently attach a different cable to the motherboard for evaluating up to 31 devices in series in addition to the one TMP107 device on the motherboard.
- The option to snap off the section of the motherboard with the TMP107 device on it and directly solder a cable with up to 32 devices in series to the controller section of the motherboard.
- An example layout for coupon boards that accept three-conductor cables.

Figure 2. TMP107EVM System Setup

3.1   Theory of Operation for the TMP107EVM

A block diagram of the TMP107 test board hardware is shown in Figure 3. The TMP107EVM motherboard contains connections for the power and the bidirectional I/O line compatible with UART protocols. For evaluation purposes, the TMP107EVM motherboard also has a break-away section of the PCB that allows for wires (the TMP107 adaptor boards, for instance) to be soldered to the TMP107EVM motherboard without first going through a TMP107 device.

Figure 3. TMP107EVM Motherboard Block Diagram

3.2 *TMP107EVM Motherboard Cable Adaptor*

If not already assembled, the basic hardware setup for the TMP107EVM is to connect the three-conductor cable to the TMP107EVM motherboard.

CAUTION
Many of the components on the TMP107EVM are susceptible to damage caused by electrostatic discharge (ESD). Customers are advised to observe proper ESD handling precautions when unpacking and handling the EVM, including the use of a grounded wrist strap at an approved ESD workstation.

Connect the three bare wires on the three-conductor cable to the three-conductor, press-fit socket (J2) on the TMP107EVM motherboard, as shown in Figure 4. Take special care to make sure that the three wires are inserted all the way and make good electrical contact with the socket, and that the red wire goes to V+, the green wire goes to IO2, and the black wire goes to GND. Plug the male USB-A adaptor on the TMP107EVM motherboard into an available USB port on the computer. This cable can be removed by inserting something rigid (like one side of a pair of tweezers) into each of the rectangular holes above each wire to release the wire clamps inside socket J2. Releasing the clamp can also help with wire insertion if the bare wire bends in the socket when pressure is applied.

NOTE: *Always* connect the three-conductor cable to the TMP107EVM motherboard before connecting J1 to a USB port to avoid any contact issues when power is applied.
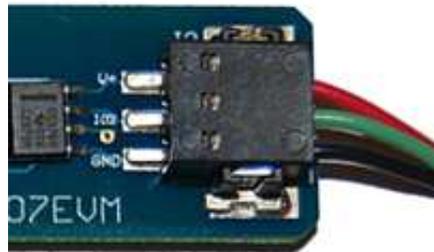
Figure 4. Three-Conductor Cable Connection

4 TMP107EVM Software

This section describes the installation and operation of the TMP107EVM software.

4.1 Hardware Requirements

The TMP107EVM software is tested on the Windows 7® operating system (OS) with United States regional settings. The software should also function correctly on other Windows operating systems.

4.2 Software Installation

The computer runs the GUI software that communicates with the TMP107EVM motherboard over a USB connection. The TMP107EVM motherboard translates the USB commands from the computer into UART communication signals for any TMP107 devices that are attached. The TMP107EVM does not require any additional components to operate.

4.2.1 Download and Install the FTDI Virtual Com Port Drivers

Download and install the Virtual Com Port drivers from www.ftdichip.com/Drivers/VCP.htm. The driver version tested with this software at the time of release is 2.12.06.

If the precompiled installer for the Virtual Com Port drivers does not work properly, then it may be necessary to use a software package to unzip the drivers from the installer executable. The hardware is in an unrecognized category in the device manager. Choose the unidentified device and update the device drivers using the **Browse** option and navigate to the folder with the driver and initialization files from the unpacked executable.

4.2.2 Download and Install the TMP107EVM GUI Software

The TMP107EVM software is available in the TMP107EVM product folder on the TI web site (www.ti.com). To install the software to your computer, download and unzip the installer. Launch the TMP107EVM installation executable, *setup.exe*, as shown in Figure 5.

Figure 5. TMP107EVM Software Installation Files

The TMP107EVM installer software then begins the installation process, as shown in Figure 6.
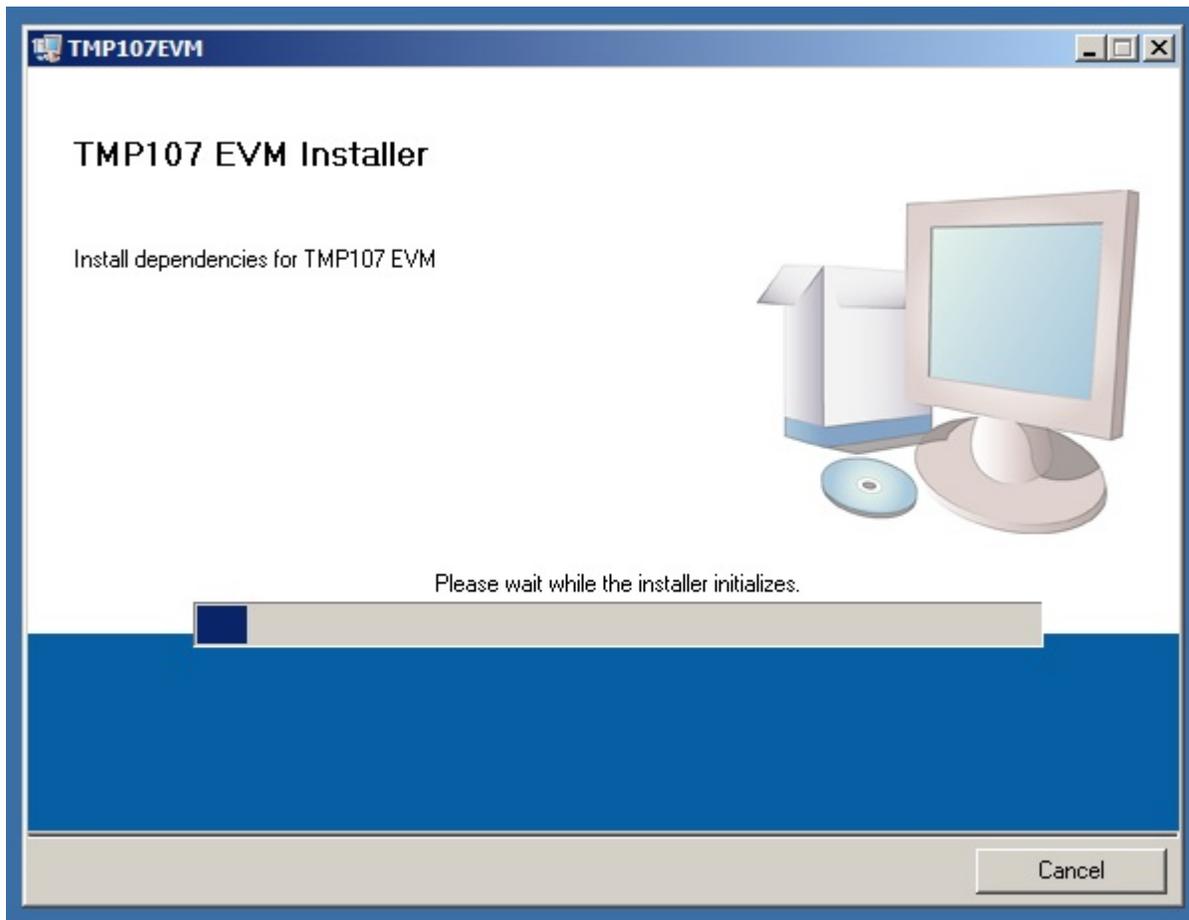
Figure 6. TMP107EVM Software Installation Launch

Follow the prompts shown in Figure 7 to install the TMP107EVM software.
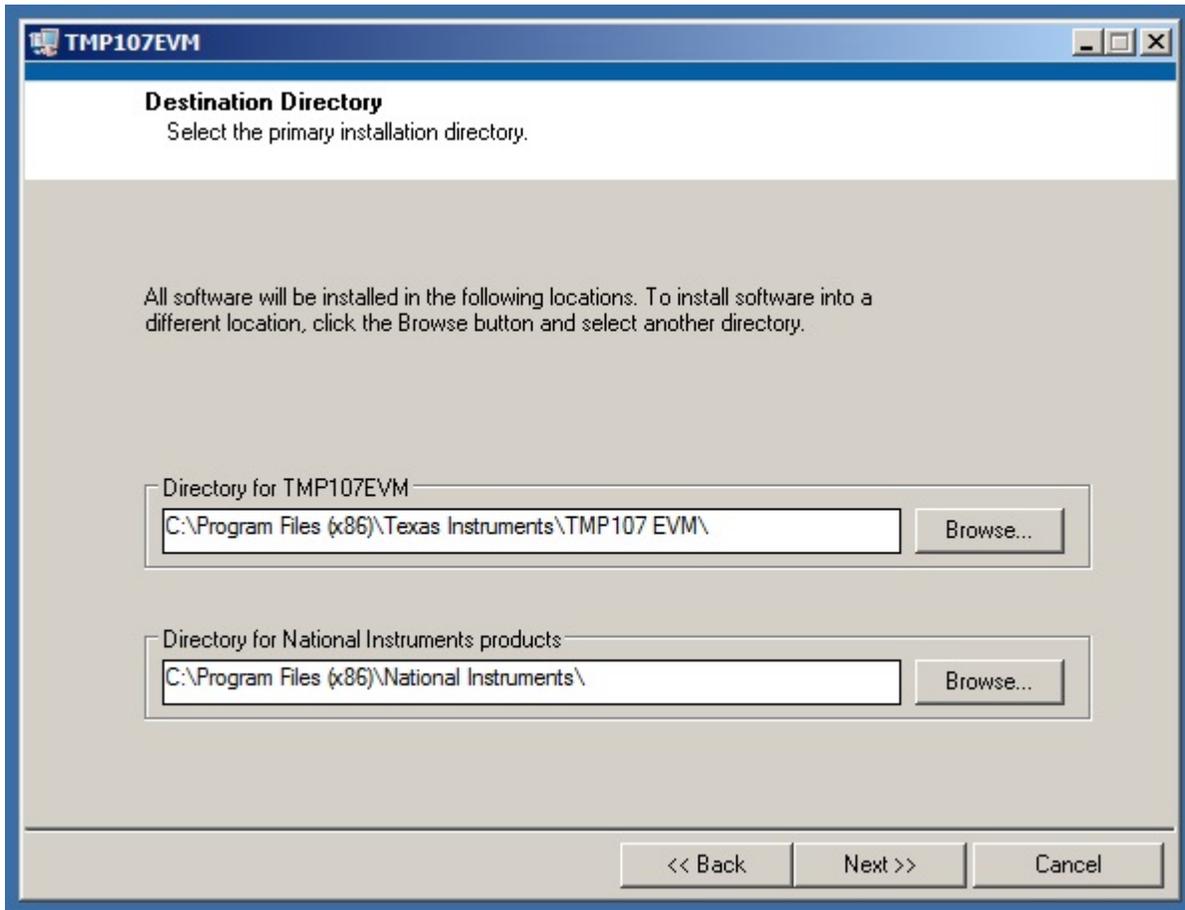
Figure 7. TMP107EVM Software Installation Prompts

Read and accept the licences shown in Figure 8 to continue installing the TMP107EVM software.
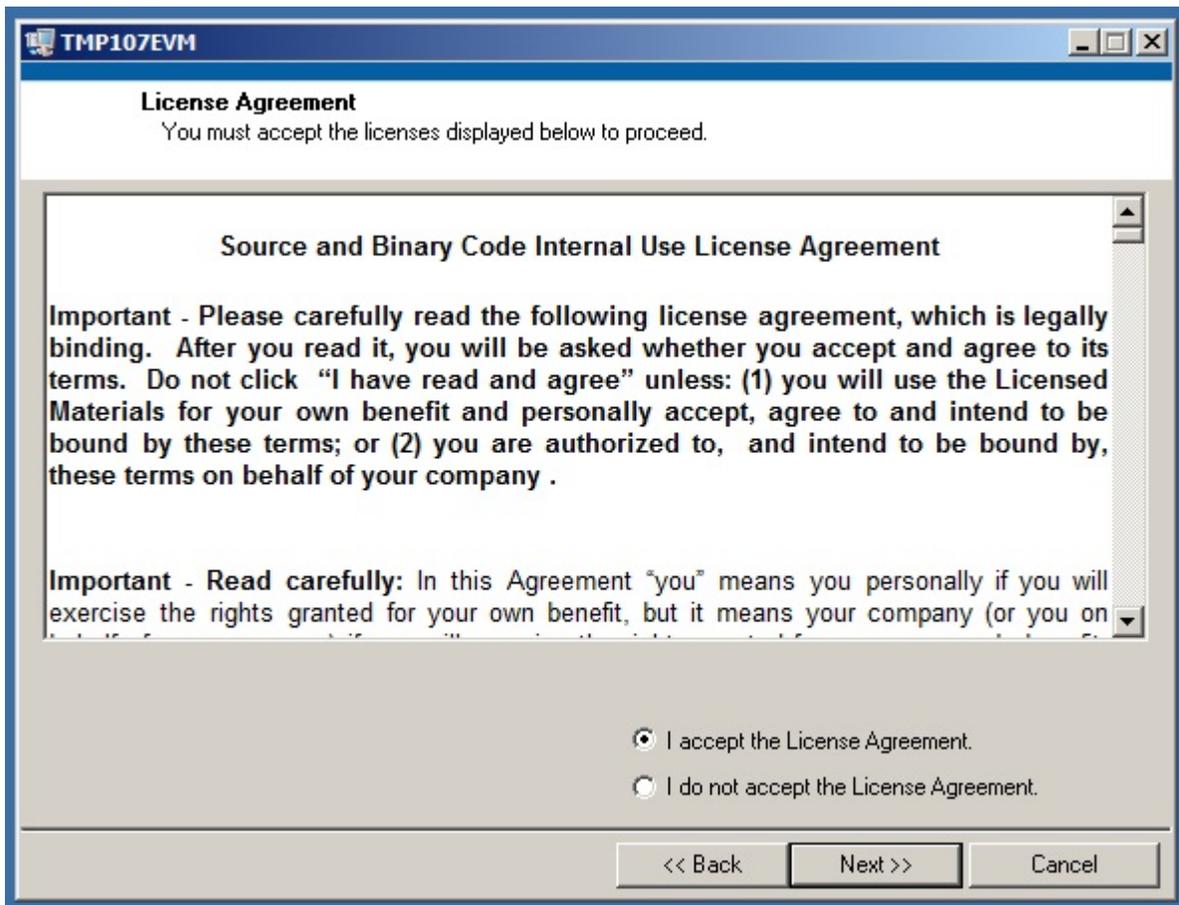
Figure 8. TMP107EVM Software Accept License Agreements Prompt

When Figure 9 is displayed, the TMP107EVM GUI software is installed.
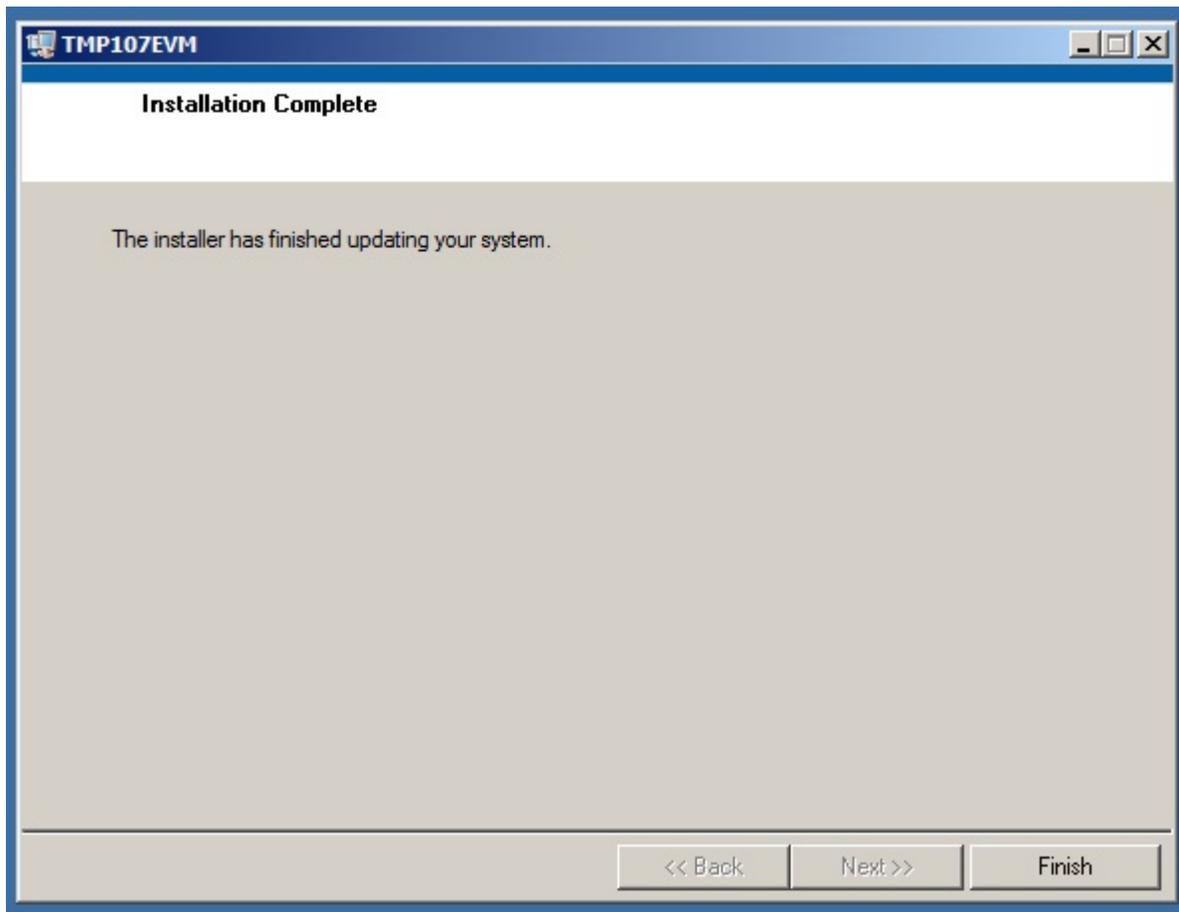
Figure 9. TMP107EVM Software Installation Complete

4.3   Connecting the Hardware

Plug J1 of the TMP107EVM motherboard into an open USB port on the computer with the drivers and TMP107EVM GUI installed. LED D1 on the motherboard illuminates green to indicate that power is connected to the motherboard from the USB port. Figure 10 shows the typical response when the TMP107EVM motherboard is plugged into the USB port of the computer for the first time. Typically, the computer responds with a *Found New Hardware, USB Device* pop-up dialog window. The pop-up window then typically changes to *Found New Hardware, USB Human Interface Device*. This pop-up indicates that the device is ready to be used.

Figure 10. Typical Response After Connecting the TMP107EVM to the Computer

When the hardware is connected, verify that the device drivers are functioning correctly by checking the *Device Manager* in the *Ports (COM & LPT)* heading, as shown in Figure 11. Find the entry labeled *USB Serial Port (COM#)* and note the number assigned to the COM port. This number is used to select the appropriate device in the software GUI; see Section 4.4.
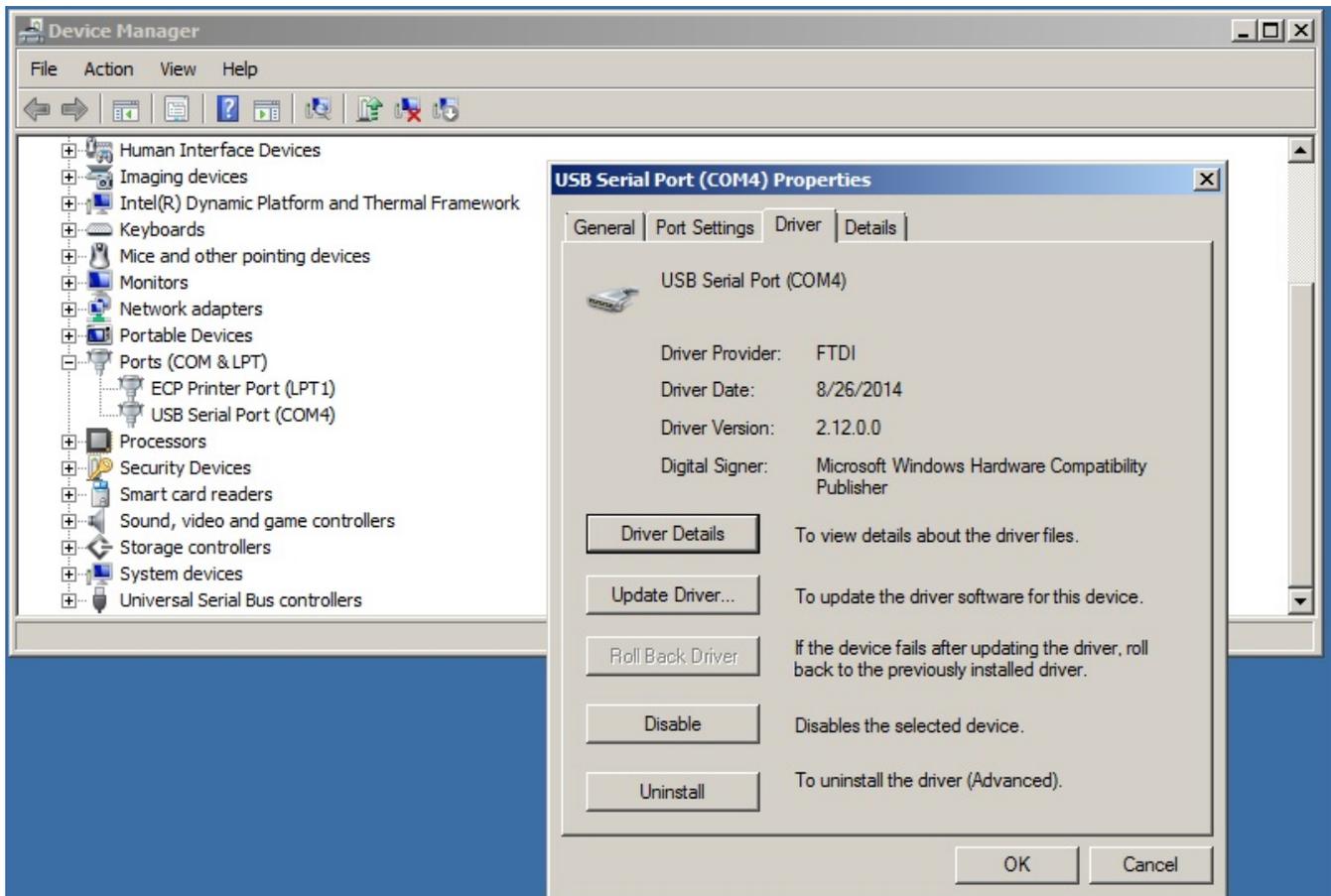
Figure 11. Virtual Com Port in the Device Manager

4.4   *Launching the TMP107EVM Software*

With the TMP107EVM properly connected (see Figure 4), launch the EVM GUI software from the Windows *Start* menu. This software is titled *TMP107 EVM* and is located in a folder called *Texas Instruments*. The software launches with an initialization screen like that shown in Figure 12.

Figure 12. TMP107EVM GUI Initialization Screen

When initialized, the software shows the main TMP107EVM GUI panel in its default configuration, as shown in Figure 13.
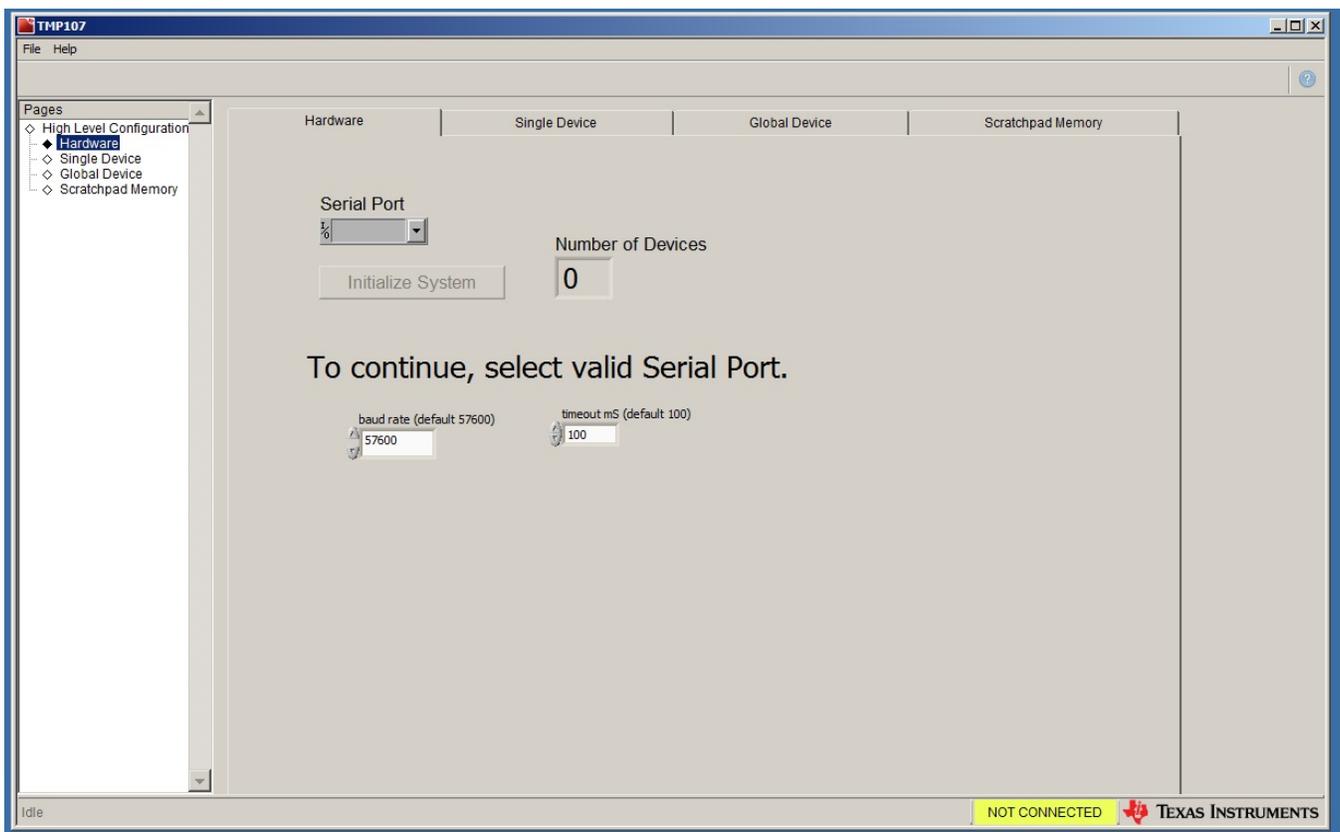
Figure 13. TMP107EVM GUI Software Default Configuration

4.5 *TMP107EVM Software Operation*

This section primarily discusses how to operate the TMP107EVM software. Basic GUI functionality and a description of the tabs are presented in this section.

4.5.1 TMP107EVM GUI Hardware Tab

Use the *Serial Port* drop-down box to select the appropriate COM port (see Figure 11). If the driver is able to connect and successfully negotiate communication between the TMP107EVM GUI and the TMP107EVM motherboard, then *CONNECTED* appears in a green box in the status bar at the bottom of the TMP107EVM GUI. The number of devices detected in the daisy-chain is also displayed, as shown in Figure 14. For the default configuration of the TMP107EVM, this number is four: one device is on the motherboard and three more devices are in the cable. The communication baud rate can be adjusted on this tab as well; choose the new desired baud rate from the drop-down box and then push the **Initialize System** button to store the settings into the GUI for hardware communication.
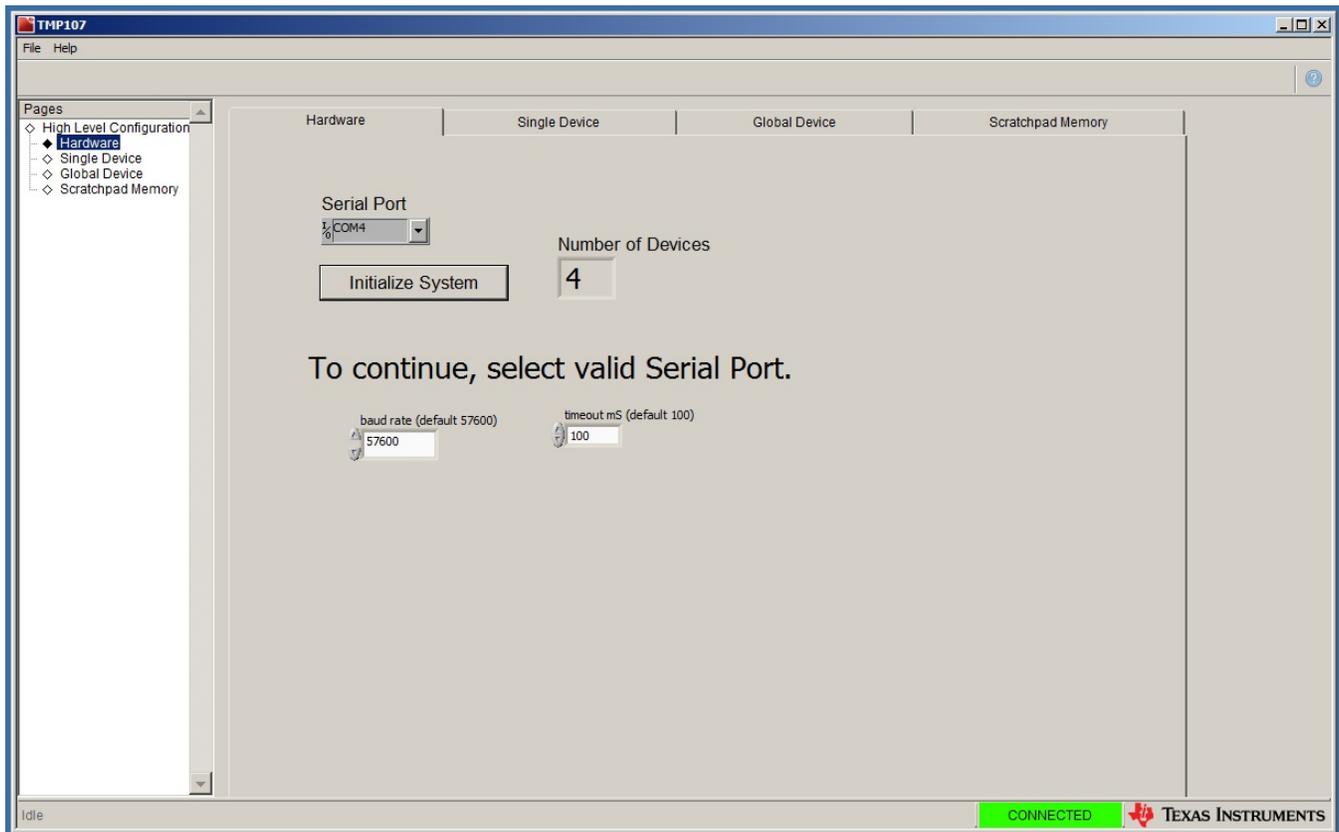
Figure 14. Hardware Tab

NOTE:	When executing commands in hardware, the Texas Instruments logo in the status bar shows a green wave to indicate that an operation is in progress. Wait for any current operations to complete before issuing more commands via the GUI controls.

4.5.2 TMP107EVM GUI Single Device Tab

The *TMP107EVM GUI Single Device* tab is shown in Figure 15. Use this tab to individually evaluate any single device in the daisy-chain by selecting the device number (denoted by its position in the daisy-chain with the lowest number closest to the TMP107EVM motherboard) in the *Device* numeric control field.

The temperature of this device can be read one time by clicking the **Indiv Temp Read** button. The temperature can be read continuously at a selected interval by entering a value for the time between readings in the *Sample Rate (ms)* field and then clicking the **Single Run Continuous** button. In either mode, the temperature is updated in the *Temperature ºC* field and is graphically updated in the *Single Temperature Plot* waveform chart. Most controls are disabled when **Single Run Continuous** is active until **Single Run Continuous** is clicked again to stop capturing measurements.
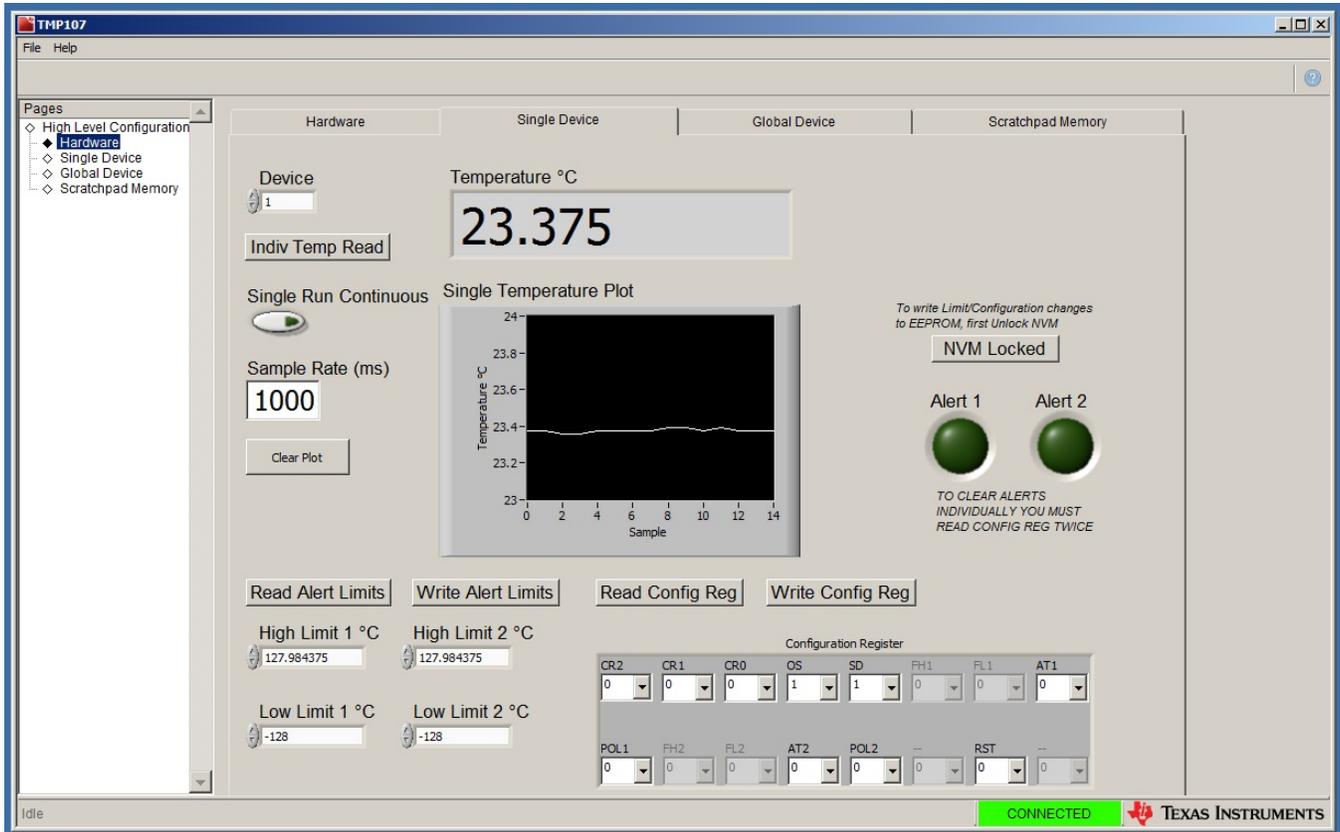
Figure 15. Single Device Tab

Use the fields labeled *High Limit 1 ºC*, *High Limit 2 ºC*, *Low Limit 1 ºC*, and *Low Limit 2 ºC* in conjunction with the **Read Alert Limits** and **Write Alert Limits** buttons to set and validate the multiple alert limit registers in each device of the TMP107EVM daisy-chain. Each numeric field accepts temperature values between −128°C and +127.984375°C, and every time that a measurement is made, the green indicators labeled *Alert 1* and *Alert 2* are updated based on the corresponding output bits from the selected TMP107 device. An example of how this tab looks when *High Limit 1 ºC* is exceeded but *High Limit 2 ºC* is not is shown in Figure 16.

The *High Limit 1 ºC, High Limit 2 ºC, Low Limit 1 ºC,* and *Low Limit 2 ºC* values can be stored in the TMP107 nonvolatile memory by first unlocking the memory by clicking the **NVM Locked** button. Click the **Write Alert Limits** button next, and finally click the **NVM Unlocked** button to complete the operation. Whenever the device is reset or power-cycled, the values written are retained in the nonvolatile memory of the TMP107 device.
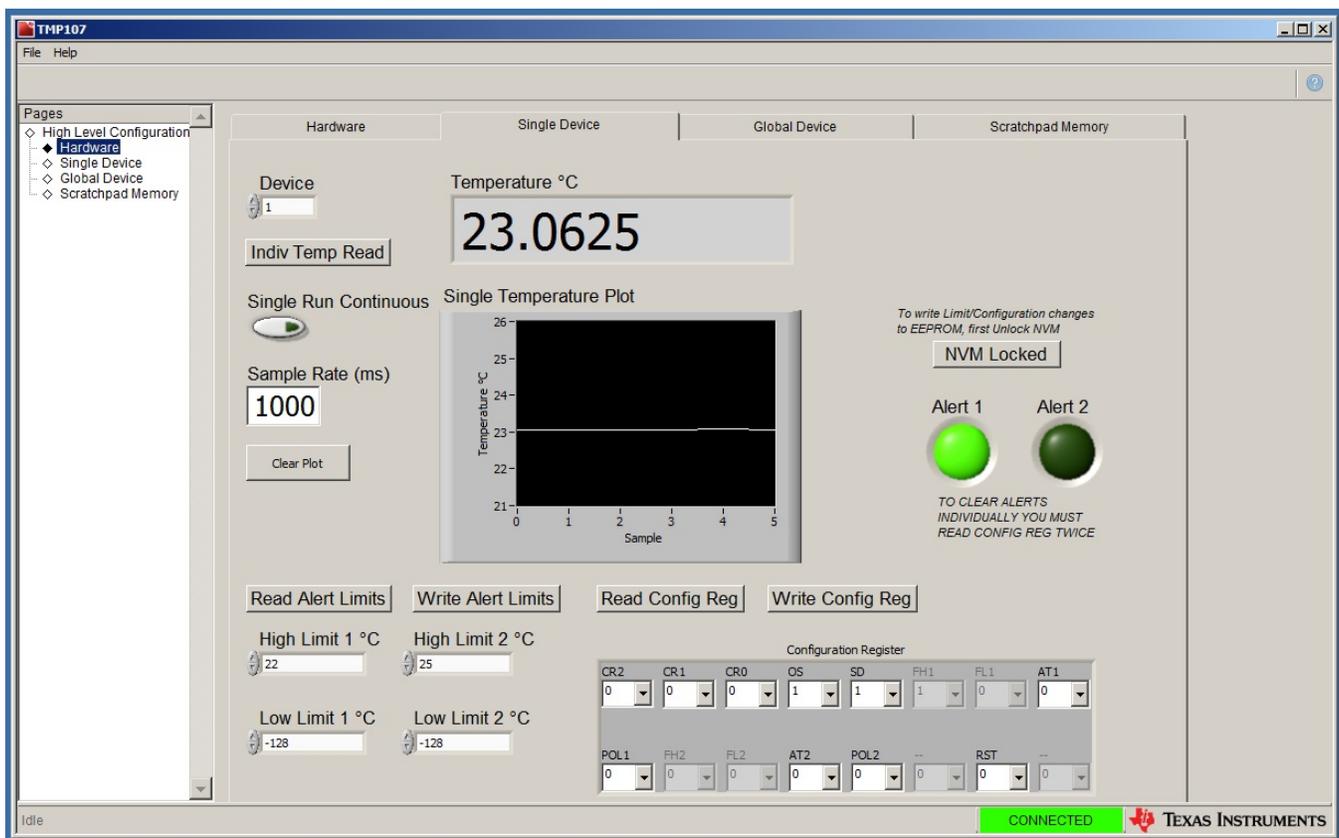
Figure 16. Alert Indicators on the Single Device Tab

Use the cluster of drop-down menus titled **Configuration Register** in conjunction with the **Read Config Reg** and **Write Config Reg** buttons to access the configuration register for the selected device. See the TMP107 data sheet for more information on the definition of the bits in the configuration register.

4.5.3   TMP107EVM GUI Global Device Tab

The *TMP107EVM GUI Global Device* tab is shown in Figure 17. Use this tab to evaluate all the detected devices in the daisy-chain at once.

The temperature of all devices can be read one time by clicking the **Read All** button. The temperature can be read continuously at a selected interval by entering a value for the time between readings in the *Sample Rate (ms)* field and then clicking the **Global Run Continuous** button. In either mode, the temperature is updated in the *Temperature Array ºC* field and is graphically updated in the *Global Temperature Plots* waveform chart, where each device is given a different line color. Most controls are disabled when the **Global Run Continuous** button is active until the **Global Run Continuous** button is clicked again to stop capturing measurements.
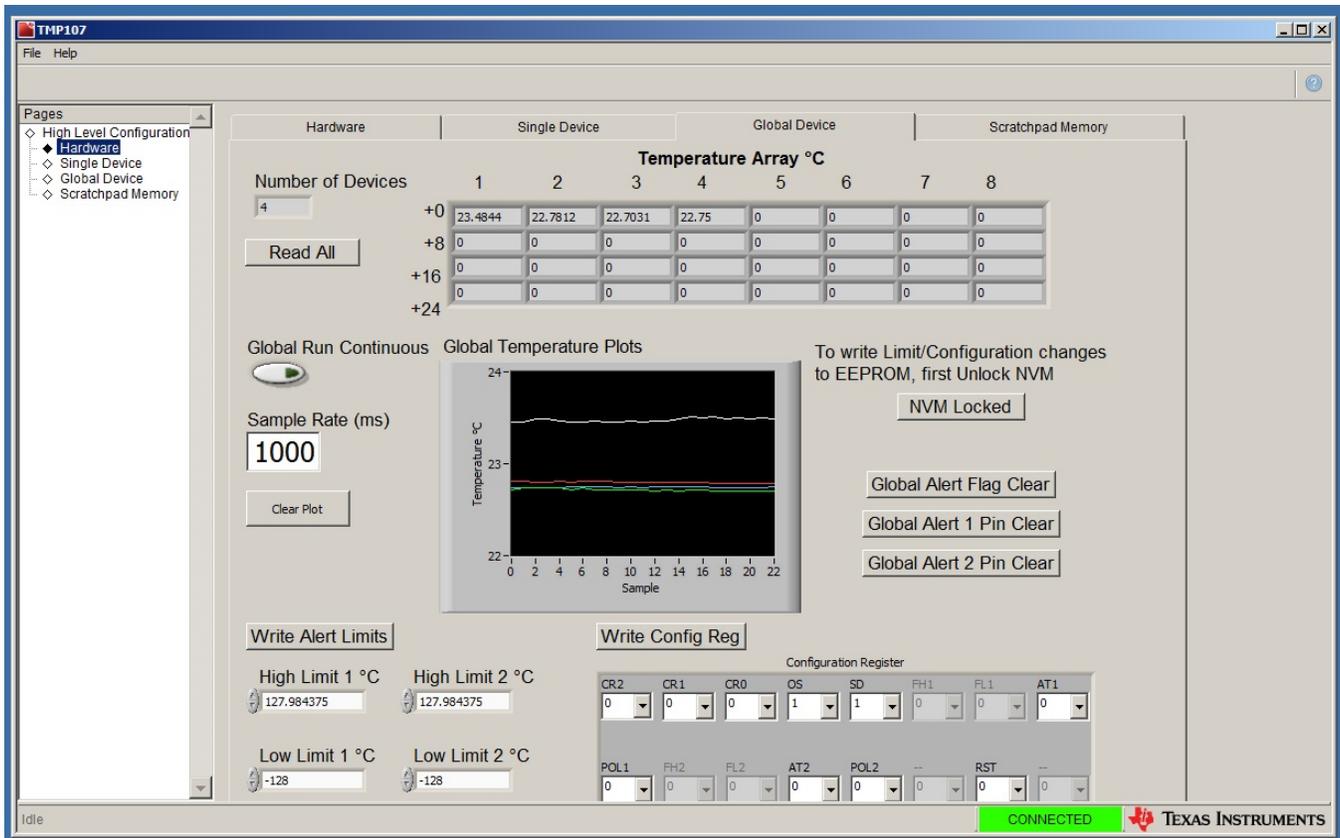
Figure 17. Global Device Tab

Use the fields labeled *High Limit 1 ºC*, *High Limit 2 ºC*, *Low Limit 1 ºC*, and *Low Limit 2 ºC* in conjunction with the **Write Alert Limits** button to set the multiple alert limit registers in each device of the TMP107EVM daisy-chain. To validate each value stored in the alert limit registers, navigate to the *Single Device* tab, select each device individually, and use the **Read Alert Limits** button to read out the values. Each numeric field accepts temperature values between –128°C and +127.984375°C. Because the TMP107EVM is designed to use only three conductor cables, the two additional conductors needed to monitor the two ALERT pins are unavailable and are therefore unsupported in this EVM. The **Global Alert Flag Clear**, **Global Alert 1 Pin Clear**, and **Global Alert 2 Pin Clear** buttons are functional and clear any latches on the ALERT pins but are also unsupported in this EVM.

The *High Limit 1 ºC*, *High Limit 2 ºC*, *Low Limit 1 ºC*, and *Low Limit 2 ºC* values can be stored in the TMP107 nonvolatile memory by first unlocking the memory by clicking the **NVM Locked** button. Click the **Write Alert Limits** button next, and finally click the **NVM Unlocked** button to complete the operation. Whenever the device is reset or power-cycled, the values written are retained in the nonvolatile memory of the TMP107 device.

Use the cluster of drop-down menus titled *Configuration Register* in conjunction with the **Write Config Reg** button to write to the configuration register for all devices. See the TMP107 data sheet for more information on the definition of the bits in the configuration register.

4.5.4 TMP107EVM GUI Scratchpad Memory Tab

The *TMP107EVM GUI Scratchpad Memory* tab is shown in Figure 18. Use the *Device* numeric field to select the target TMP107 device for memory access. Use the **Read Scratchpad** button at any time to read the contents of the memory in the target TMP107 device; the values will be populated into the gray fields labeled *x6* through *xD*. To write values to these registers, first fill out the white fields labeled *x6* through *xD* with the desired target values. Click the **Unlock NVM** button, followed by the **Write Scracthpad** button, and finally the **Lock NVM** button.
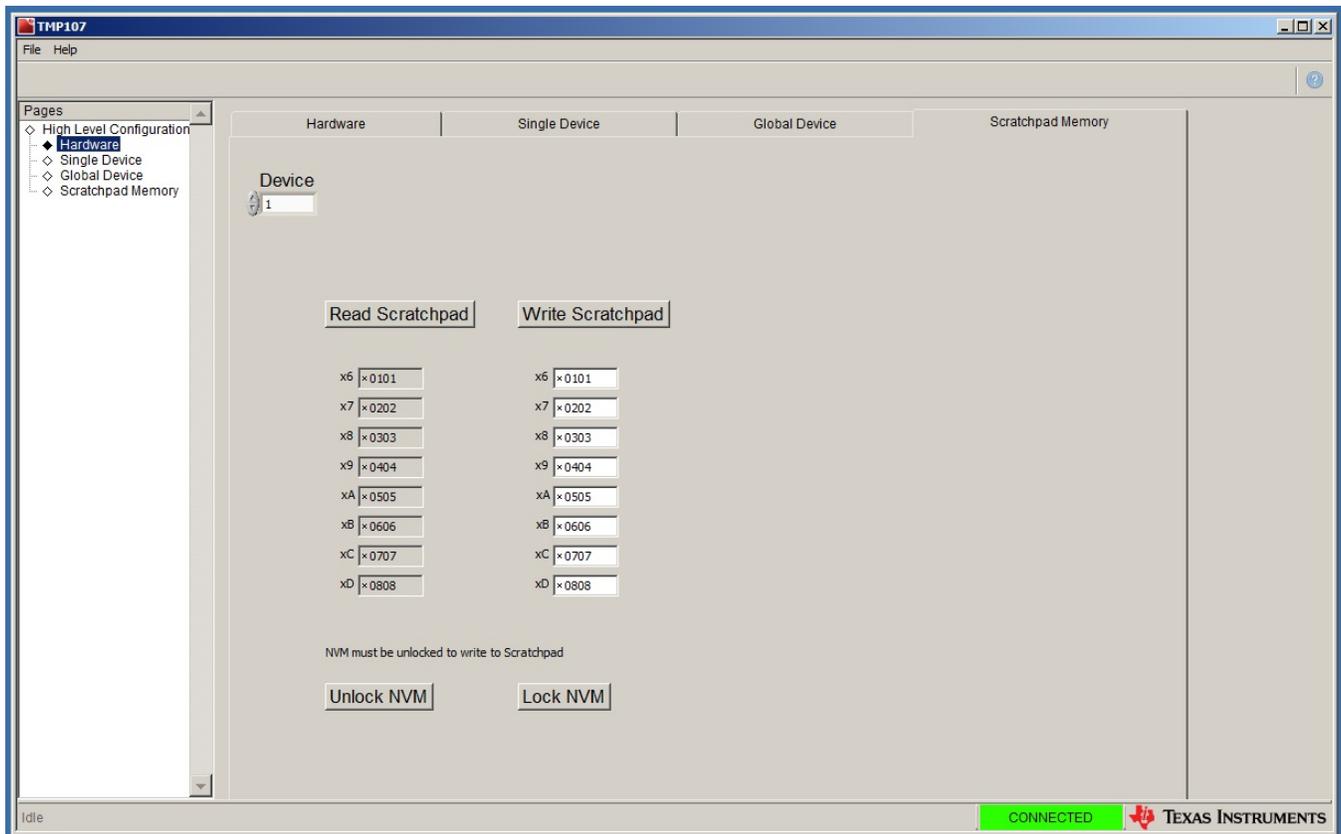
Figure 18. Scratchpad Memory Tab

5   Schematic, PCB Layout, and Bill of Materials

The TMP107EVM motherboard and adaptor PCBs are fabricated as one PCB and broken apart. The schematic, assembly drawing, PCB layer plots, and BOM reflect this.

5.1   Schematic

Figure 19 and Figure 20 illustrate the complete schematic of the TMP107EVM.
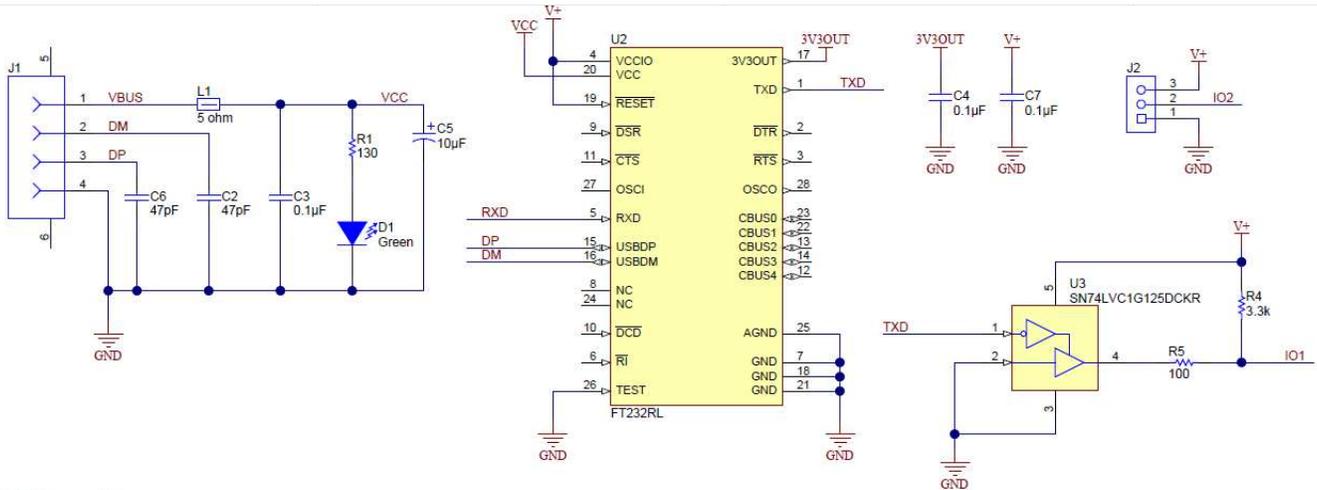
Figure 19. TMP107EVM Schematic
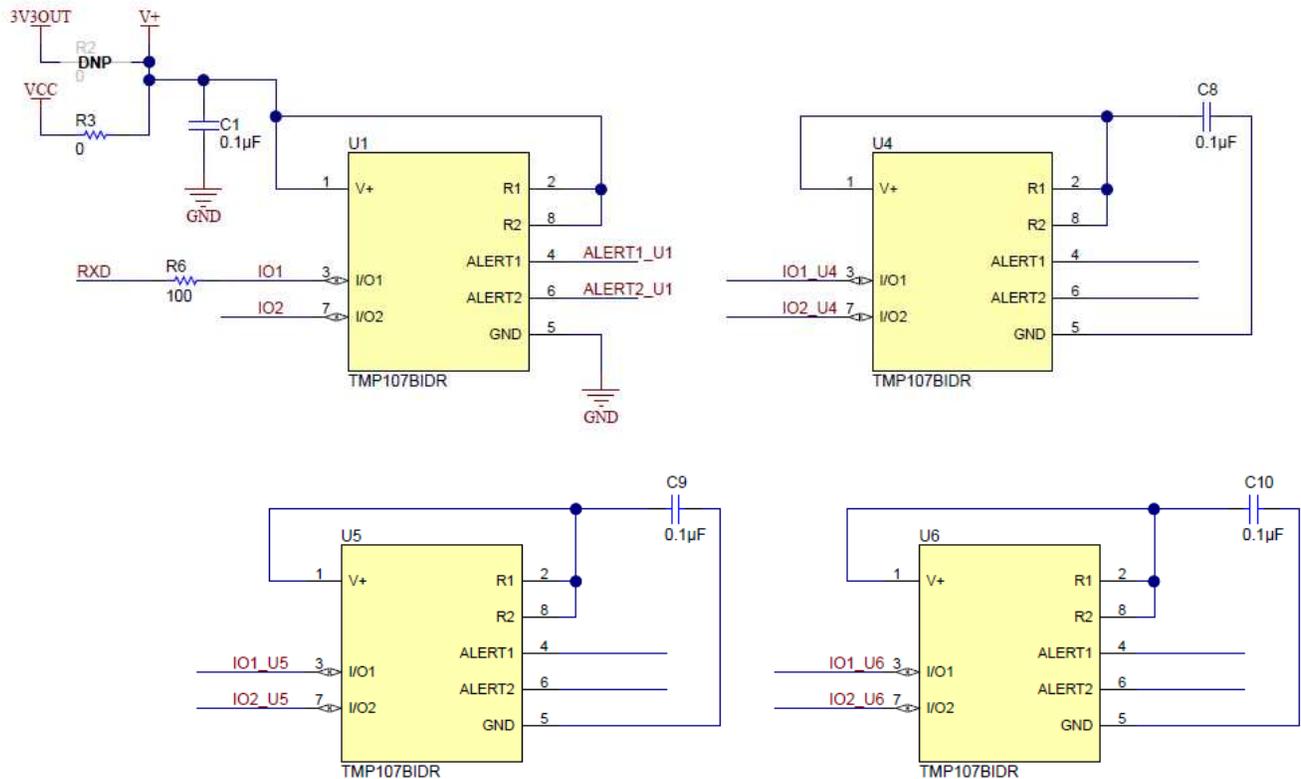
Figure 20. TMP107EVM Schematic (Continued)

5.2 Assembly Drawing

Figure 21 is the assembly drawing for the TMP107EVM.
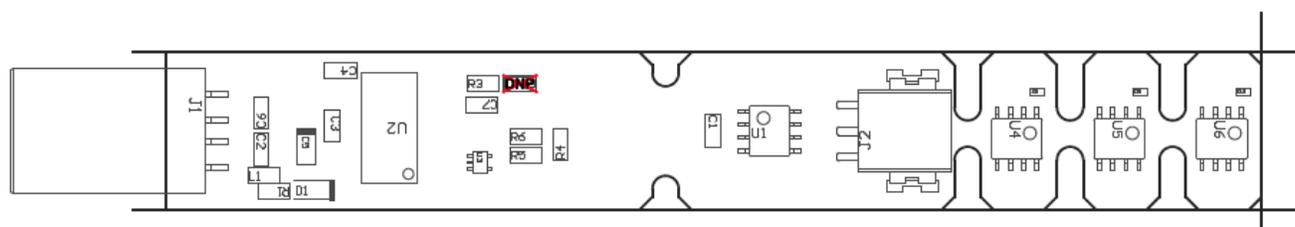
COMPONENTS MARKED 'DNP' SHOULD NOT BE POPULATED.
ASSEMBLY VARIANT: 001

Figure 21. TMP107EVM PCB Assembly Drawing

5.3 PCB Layout

Figure 22 and Figure 23 show the top and bottom PCB layers, respectively, of the test board.
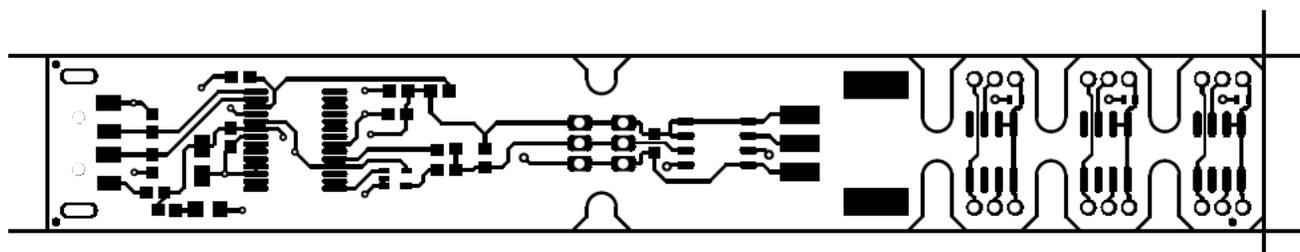
Figure 22. PCB Top Layer
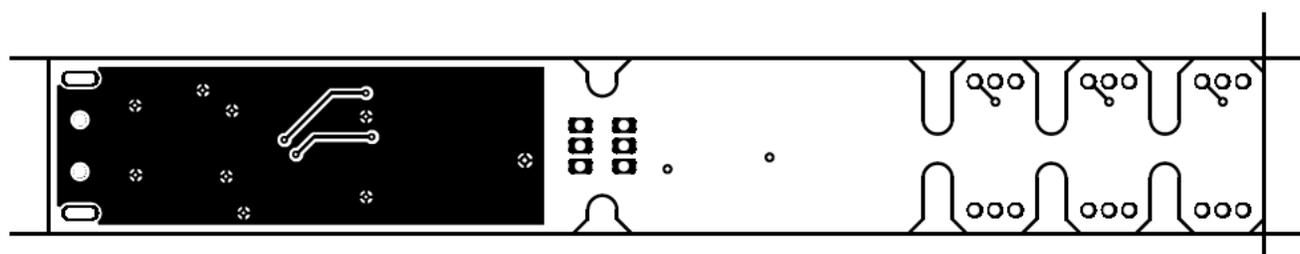
Figure 23. PCB Bottom Layer

Figure 24 and Figure 25 show the silkscreen for the top and bottom PCB layers, respectively.
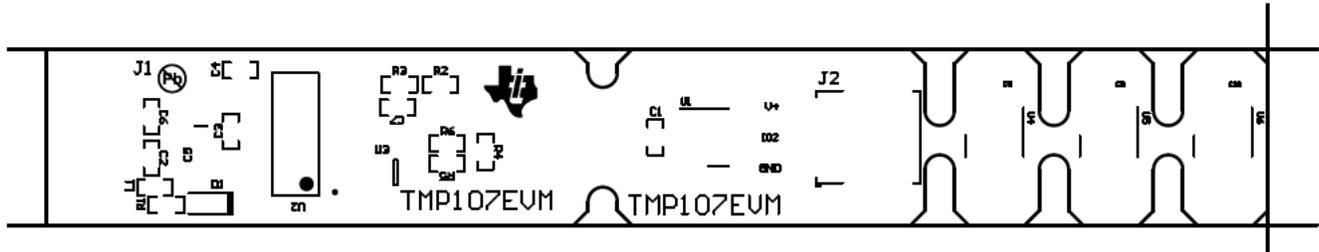
Figure 24. PCB Top-Layer Silk
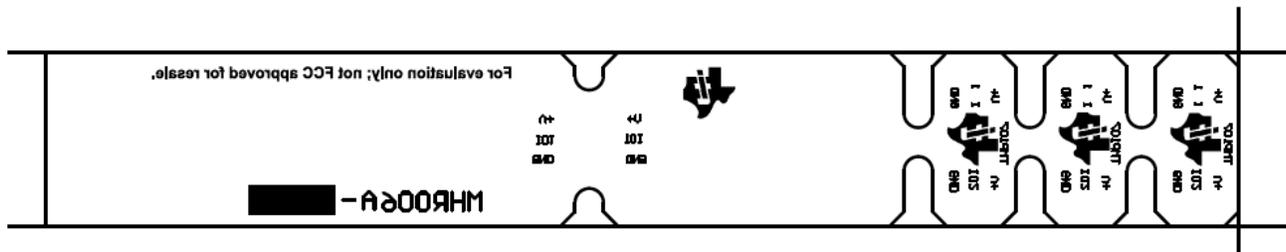
Figure 25. PCB Bottom-Layer Silk

5.4 Bill of Materials

Table 3 lists the bill of materials for the TMP107EVM motherboard.

Table 3. TMP107EVM Motherboard Parts List

Qty	RefDes	Description	Part Number	MFR
4	C1, C3, C4, C7	CAP, CERM, 0.1 µF, 25 V, +/- 5%, X7R, 0603	06033C104JAT2A	AVX
2	C2, C6	CAP, CERM, 47 pF, 50 V, +/- 5%, C0G/NP0, 0603	06035A470JAT2A	AVX
1	C5	CAP, TA, 10 µF, 10 V, +/- 10%, 1.8 ohm, SMD	T495A106K010ATE1K8	Kemet
3	C8, C9, C10	CAP, CERM, 0.1 µF, 10 V, +/- 10%, X5R, 0402	C1005X5R1A104K050BA	TDK
1	D1	LED, Green, SMD	LTST-C170KGKT	Lite-On
1	J1	Connector, Plug, USB Type A, R/A, Top Mount SMT	48037-2200	Molex
1	J2	Terminal Block, 2.5 mm, 3 x 1, R/A, SMT	1771033	Phoenix Contact
1	L1	Ferrite Bead, 5 ohm @ 100 MHz, 0.7 A, 0603	BLM18BB050SN1D	MuRata
1	R1	RES, 130, 5%, 0.1 W, 0603	CRCW0603130RJNEA	Vishay-Dale
1	R3	RES, 0, 5%, 0.1 W, 0603	CRCW06030000Z0EA	Vishay-Dale
1	R4	RES, 3.3 k, 5%, 0.1 W, 0603	CRCW06033K30JNEA	Vishay-Dale
2	R5, R6	RES, 100, 5%, 0.1 W, 0603	CRCW0603100RJNEA	Vishay-Dale
4	U1, U4, U5, U6	±0.5°C Temperature Sensor with SMAART One-Wire Interface, EEPROM, and Alert Function	TMP107BIDR	Texas Instruments
1	U2	USB to Serial UART, SSOP28	FT232RL	FTDI
1	U3	Single Bus Buffer Gate With 3-State Output, DCK0005A	SN74LVC1G125DCKR	Texas Instruments
3m	WIRE	1000ft of 3-conductor, 24 AWG, Gray wire	C2462A.41.10	General Cable/Carol Brand

STANDARD TERMS AND CONDITIONS FOR EVALUATION MODULES

1. *Delivery:* TI delivers TI evaluation boards, kits, or modules, including any accompanying demonstration software, components, or documentation (collectively, an "EVM" or "EVMs") to the User ("User") in accordance with the terms and conditions set forth herein. Acceptance of the EVM is expressly subject to the following terms and conditions.

   1.1 EVMs are intended solely for product or software developers for use in a research and development setting to facilitate feasibility evaluation, experimentation, or scientific analysis of TI semiconductors products. EVMs have no direct function and are not finished products. EVMs shall not be directly or indirectly assembled as a part or subassembly in any finished product. For clarification, any software or software tools provided with the EVM ("Software") shall not be subject to the terms and conditions set forth herein but rather shall be subject to the applicable terms and conditions that accompany such Software

   1.2 EVMs are not intended for consumer or household use. EVMs may not be sold, sublicensed, leased, rented, loaned, assigned, or otherwise distributed for commercial purposes by Users, in whole or in part, or used in any finished product or production system.

2. *Limited Warranty and Related Remedies/Disclaimers*:

   2.1 These terms and conditions do not apply to Software. The warranty, if any, for Software is covered in the applicable Software License Agreement.

   2.2 TI warrants that the TI EVM will conform to TI's published specifications for ninety (90) days after the date TI delivers such EVM to User. Notwithstanding the foregoing, TI shall not be liable for any defects that are caused by neglect, misuse or mistreatment by an entity other than TI, including improper installation or testing, or for any EVMs that have been altered or modified in any way by an entity other than TI. Moreover, TI shall not be liable for any defects that result from User's design, specifications or instructions for such EVMs. Testing and other quality control techniques are used to the extent TI deems necessary or as mandated by government requirements. TI does not test all parameters of each EVM.

   2.3 If any EVM fails to conform to the warranty set forth above, TI's sole liability shall be at its option to repair or replace such EVM, or credit User's account for such EVM. TI's liability under this warranty shall be limited to EVMs that are returned during the warranty period to the address designated by TI and that are determined by TI not to conform to such warranty. If TI elects to repair or replace such EVM, TI shall have a reasonable time to repair such EVM or provide replacements. Repaired EVMs shall be warranted for the remainder of the original warranty period. Replaced EVMs shall be warranted for a new full ninety (90) day warranty period.

3. *Regulatory Notices:*

   3.1 *United States*

      3.1.1 *Notice applicable to EVMs not FCC-Approved:*

      This kit is designed to allow product developers to evaluate electronic components, circuitry, or software associated with the kit to determine whether to incorporate such items in a finished product and software developers to write software applications for use with the end product. This kit is not a finished product and when assembled may not be resold or otherwise marketed unless all required FCC equipment authorizations are first obtained. Operation is subject to the condition that this product not cause harmful interference to licensed radio stations and that this product accept harmful interference. Unless the assembled kit is designed to operate under part 15, part 18 or part 95 of this chapter, the operator of the kit must operate under the authority of an FCC license holder or must secure an experimental authorization under part 5 of this chapter.

      3.1.2 *For EVMs annotated as FCC – FEDERAL COMMUNICATIONS COMMISSION Part 15 Compliant:*

      CAUTION

      This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

      Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

      FCC Interference Statement for Class A EVM devices

      NOTE: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

FCC Interference Statement for Class B EVM devices

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- *Reorient or relocate the receiving antenna.*
- *Increase the separation between the equipment and receiver.*
- *Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.*
- *Consult the dealer or an experienced radio/TV technician for help.*

3.2 *Canada*

  3.2.1 *For EVMs issued with an Industry Canada Certificate of Conformance to RSS-210*

Concerning EVMs Including Radio Transmitters:

This device complies with Industry Canada license-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Concernant les EVMs avec appareils radio:

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes: (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

Concerning EVMs Including Detachable Antennas:

Under Industry Canada regulations, this radio transmitter may only operate using an antenna of a type and maximum (or lesser) gain approved for the transmitter by Industry Canada. To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (e.i.r.p.) is not more than that necessary for successful communication. This radio transmitter has been approved by Industry Canada to operate with the antenna types listed in the user guide with the maximum permissible gain and required antenna impedance for each antenna type indicated. Antenna types not included in this list, having a gain greater than the maximum gain indicated for that type, are strictly prohibited for use with this device.

Concernant les EVMs avec antennes détachables

Conformément à la réglementation d'Industrie Canada, le présent émetteur radio peut fonctionner avec une antenne d'un type et d'un gain maximal (ou inférieur) approuvé pour l'émetteur par Industrie Canada. Dans le but de réduire les risques de brouillage radioélectrique à l'intention des autres utilisateurs, il faut choisir le type d'antenne et son gain de sorte que la puissance isotrope rayonnée équivalente (p.i.r.e.) ne dépasse pas l'intensité nécessaire à l'établissement d'une communication satisfaisante. Le présent émetteur radio a été approuvé par Industrie Canada pour fonctionner avec les types d'antenne énumérés dans le manuel d'usage et ayant un gain admissible maximal et l'impédance requise pour chaque type d'antenne. Les types d'antenne non inclus dans cette liste, ou dont le gain est supérieur au gain maximal indiqué, sont strictement interdits pour l'exploitation de l'émetteur

3.3 *Japan*

  3.3.1 *Notice for EVMs delivered in Japan:* Please see http://www.tij.co.jp/lsds/ti_ja/general/eStore/notice_01.page 日本国内に輸入される評価用キット、ボードについては、次のところをご覧ください。
http://www.tij.co.jp/lsds/ti_ja/general/eStore/notice_01.page

  3.3.2 *Notice for Users of EVMs Considered "Radio Frequency Products" in Japan:* EVMs entering Japan may not be certified by TI as conforming to Technical Regulations of Radio Law of Japan.

If User uses EVMs in Japan, not certified to Technical Regulations of Radio Law of Japan, User is required by Radio Law of Japan to follow the instructions below with respect to EVMs:

1. Use EVMs in a shielded room or any other test facility as defined in the notification #173 issued by Ministry of Internal Affairs and Communications on March 28, 2006, based on Sub-section 1.1 of Article 6 of the Ministry's Rule for Enforcement of Radio Law of Japan,

2. Use EVMs only after User obtains the license of Test Radio Station as provided in Radio Law of Japan with respect to EVMs, or

3. Use of EVMs only after User obtains the Technical Regulations Conformity Certification as provided in Radio Law of Japan with respect to EVMs. Also, do not transfer EVMs, unless User gives the same notice above to the transferee. Please note that if User does not follow the instructions above, User will be subject to penalties of Radio Law of Japan.

【無線電波を送信する製品の開発キットをお使いになる際の注意事項】 開発キットの中には技術基準適合証明を受けて
いないものがあります。 技術適合証明を受けていないもののご使用に際しては、電波法遵守のため、以下のいずれかの
措置を取っていただく必要がありますのでご注意ください。

1. 電波法施行規則第6条第1項第1号に基づく平成18年3月28日総務省告示第173号で定められた電波暗室等の試験設備でご使用
   いただく。
2. 実験局の免許を取得後ご使用いただく。
3. 技術基準適合証明を取得後ご使用いただく。

なお、本製品は、上記の「ご使用にあたっての注意」を譲渡先、移転先に通知しない限り、譲渡、移転できないものとします。
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> 3.3.3 *Notice for EVMs for Power Line Communication:* Please see http://www.tij.co.jp/lsds/ti_ja/general/eStore/notice_02.page
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> い。http://www.tij.co.jp/lsds/ti_ja/general/eStore/notice_02.page

4 *EVM Use Restrictions and Warnings:*

4.1 EVMS ARE NOT FOR USE IN FUNCTIONAL SAFETY AND/OR SAFETY CRITICAL EVALUATIONS, INCLUDING BUT NOT LIMITED TO EVALUATIONS OF LIFE SUPPORT APPLICATIONS.

4.2 User must read and apply the user guide and other available documentation provided by TI regarding the EVM prior to handling or using the EVM, including without limitation any warning or restriction notices. The notices contain important safety information related to, for example, temperatures and voltages.

4.3 *Safety-Related Warnings and Restrictions:*

4.3.1 User shall operate the EVM within TI's recommended specifications and environmental considerations stated in the user guide, other available documentation provided by TI, and any other applicable requirements and employ reasonable and customary safeguards. Exceeding the specified performance ratings and specifications (including but not limited to input and output voltage, current, power, and environmental ranges) for the EVM may cause personal injury or death, or property damage. If there are questions concerning performance ratings and specifications, User should contact a TI field representative prior to connecting interface electronics including input power and intended loads. Any loads applied outside of the specified output range may also result in unintended and/or inaccurate operation and/or possible permanent damage to the EVM and/or interface electronics. Please consult the EVM user guide prior to connecting any load to the EVM output. If there is uncertainty as to the load specification, please contact a TI field representative. During normal operation, even with the inputs and outputs kept within the specified allowable ranges, some circuit components may have elevated case temperatures. These components include but are not limited to linear regulators, switching transistors, pass transistors, current sense resistors, and heat sinks, which can be identified using the information in the associated documentation. When working with the EVM, please be aware that the EVM may become very warm.

4.3.2 EVMs are intended solely for use by technically qualified, professional electronics experts who are familiar with the dangers and application risks associated with handling electrical mechanical components, systems, and subsystems. User assumes all responsibility and liability for proper and safe handling and use of the EVM by User or its employees, affiliates, contractors or designees. User assumes all responsibility and liability to ensure that any interfaces (electronic and/or mechanical) between the EVM and any human body are designed with suitable isolation and means to safely limit accessible leakage currents to minimize the risk of electrical shock hazard. User assumes all responsibility and liability for any improper or unsafe handling or use of the EVM by User or its employees, affiliates, contractors or designees.

4.4 User assumes all responsibility and liability to determine whether the EVM is subject to any applicable international, federal, state, or local laws and regulations related to User's handling and use of the EVM and, if applicable, User assumes all responsibility and liability for compliance in all respects with such laws and regulations. User assumes all responsibility and liability for proper disposal and recycling of the EVM consistent with all applicable international, federal, state, and local requirements.

5. *Accuracy of Information:* To the extent TI provides information on the availability and function of EVMs, TI attempts to be as accurate as possible. However, TI does not warrant the accuracy of EVM descriptions, EVM availability or other information on its websites as accurate, complete, reliable, current, or error-free.

6. *Disclaimers:*

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8. *Limitations on Damages and Liability:*

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10. *Governing Law:* These terms and conditions shall be governed by and interpreted in accordance with the laws of the State of Texas, without reference to conflict-of-laws principles. User agrees that non-exclusive jurisdiction for any dispute arising out of or relating to these terms and conditions lies within courts located in the State of Texas and consents to venue in Dallas County, Texas. Notwithstanding the foregoing, any judgment may be enforced in any United States or foreign court, and TI may seek injunctive relief in any United States or foreign court.

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