

LM95235EVAL User's Guide

CONTENTS

1	INTRODUCTION	1
2	SETUP.....	3
3	BOARD LAYOUT.....	10
4	SCHEMATIC	13

LIST OF FIGURES

1	Block Diagram.....	2
2	Jumper Settings	3
3	LM95235 Connections	4
4	Open Device Selections.....	5
5	LM95235 Desired Hardware.....	6
6	LM95235 Evaluation Board Page.....	6
7	LM95235 Evaluation Board Page.....	7
8	LM95235 Evaluation Board Page.....	7
9	LM95235 Evaluation Board Page.....	7
10	LM95235 Evaluation Board Page.....	7
11	LM95235 Temperature Graph In Deg C.....	8
12	LM95235 Log File.....	8
13	Top Assembly Layer	10
14	Top Layer Routing	11
15	Bottom Layer Routing	12
16	LM95235 Schematic	13

LIST OF TABLES

1	Device and Package Configurations.....	3
2	LM95235 Jumper Configurations and Header Pin Output Signals.....	9
3	LM95235EVAL Bill of Materials	14

1.0 Introduction

The Texas Instruments LM95235EVAL board helps designers evaluate the operation and performance of the LM95235 Precision Remote Diode Temperature Sensor With SMBus Interface and Tru Therm™ Technology. The LM95235EVAL Evaluation Board is used together with the Texas Instruments SensorEval software (downloaded on the web), and with a USB cable (not provided in the kit), and with an external personal computer (PC). Power to the LM95235EVAL/NOPB Evaluation Board is provided by the +5 VDC line from the USB connection. No external power supply or signal sources are required for operation of the LM95235 evaluation board.

Before connecting the PC to the LM95235EVAL evaluation board through the USB cable, the PC is first turned on and allowed to go through its boot-up procedure. The user installs and initiates the SensorEval software after downloading from <http://www.ti.com/tool/sensoreval>.

After the SensorEval software is running, the user can connect the USB cable first to the computer and then to the LM95235EVAL/NOPB Evaluation Board.

The PC should be able to recognize the board, and the user simply selects the LM95235 Evaluation Board radio button.

The block diagram below describes the LM95235EVAL/NOPB Evaluation Board. The USB input provides the +5.0 VDC power to the board, which is regulated down to 3.3 VDC to power the IC's. The EEPROM is programmed at the factory with a unique ID code for this particular board. When the USB cable is plugged in, the PC interrogates the USB devices and can identify this device as the LM95235 Evaluation Board.

The microcontroller on the board provides the serial SMBus clock (SMBCLK), provides the SMBus data (SMBDAT) signal, and relays the information from the LM95235 to the PC via the USB lines.

The block in the lower right of the Block Diagram shows the signals that are available to probe by the user for the LM95235 device on the board.

1.1 Block Diagram

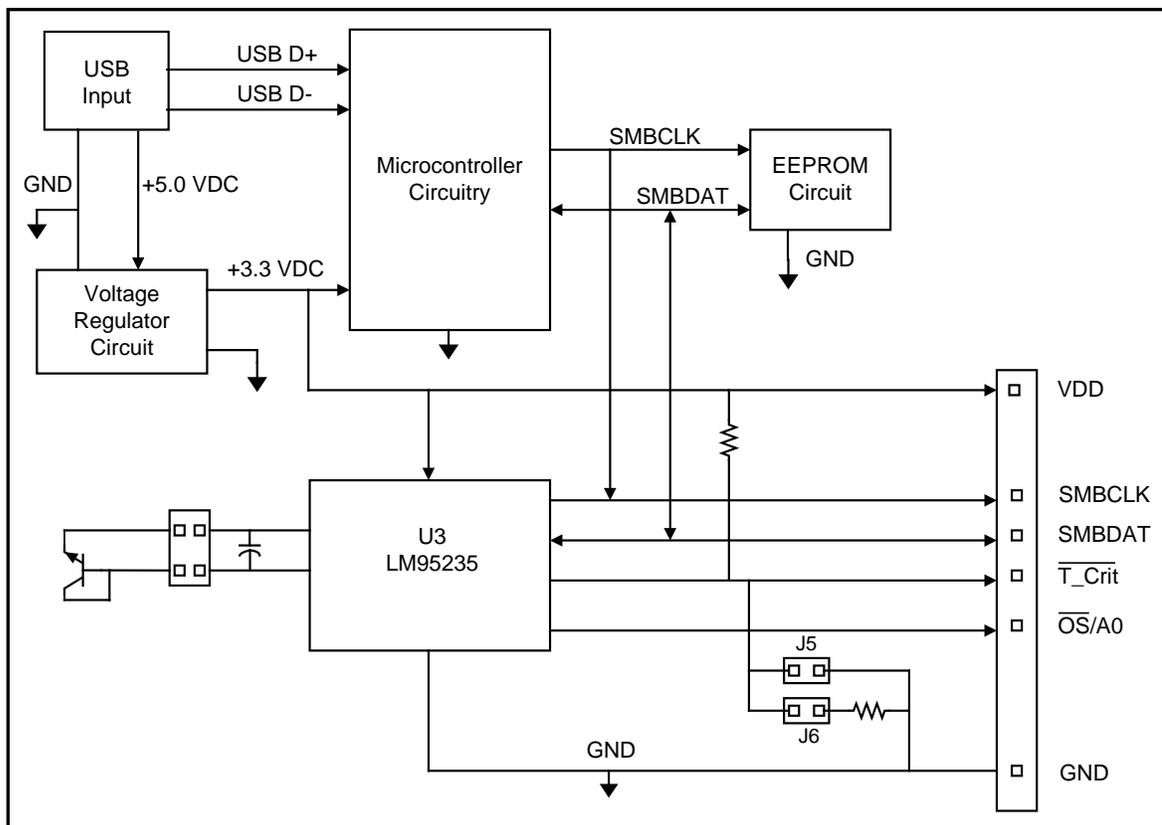


Figure 1: LM95235 Block Diagram

The EVM contains one sensor which is attached to the EVM (See Table 1).

Table 1: Device and Package Configurations

CONVERTER	IC	PACKAGE
U3	LM95235C1MM/NOPB	MINI SOIC-8

2.0 Setup

This section describes the software download, jumpers and connectors on the EVM as well as how to properly connect, set up and use the LM95235EVAL board.

2.1 Software Download

1. Download the latest SensorEval software at <http://www.ti.com/tool/sensoreval>
2. Save or run the zip file.
3. Open the file and click on the SensorEval Setup.exe file.
4. Follow the screen instructions.

2.2 Input/Output Connector Description

1. **JP2** – Output header provides the user with signals for test purposes only.
Note: Do not apply any external power or signals to any of these header pins.
2. **J3** – USB cable input. Connect the USB cable to this jack **after** the SensorEval software has been loaded on the PC.
3. **J4** – Connection to the temperature diodes. Pins 1-2 & 3-4 should be shorted.
Note: Do not apply any external power or signals to any of these header pins.
4. **J5, J6-** These are jumpered as indicated if the LM95235 is in the A0 Address Selection function mode.

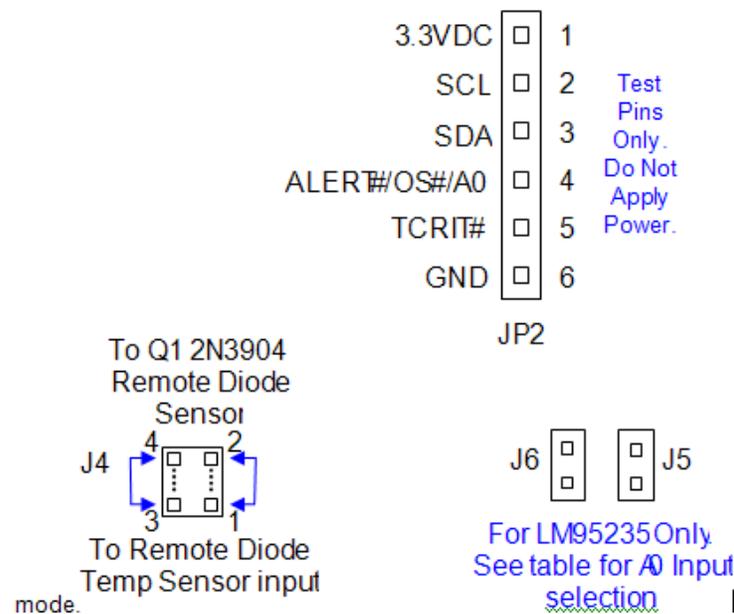


Figure 2: LM95235 Jumper Settings

2.3 Setup

Important! NO EXTERNAL POWER SUPPLY OR SIGNAL INPUTS ARE REQUIRED!

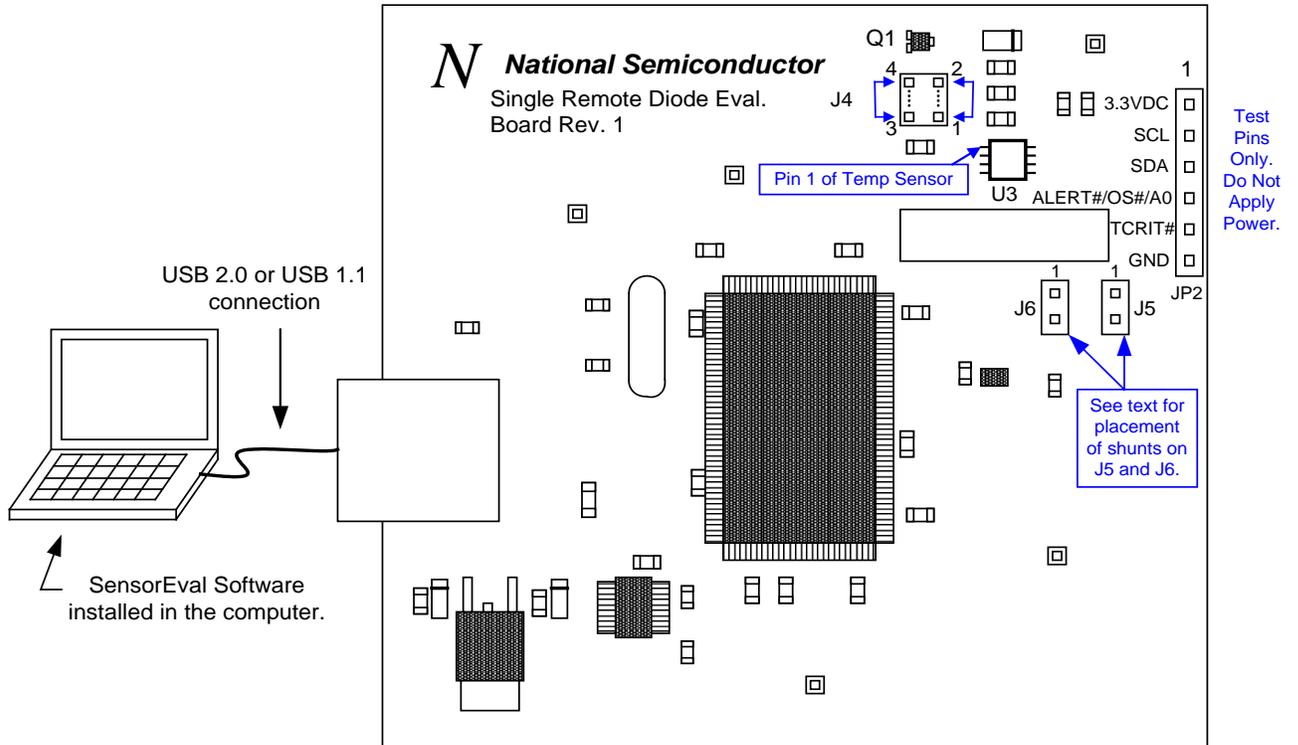


Figure 3: LM95235 Connections

3.0 Operation

3.1 For proper operation of the LM95235EVAL board **J4** pins 1-2 & 3-4 should be shorted. Jumpers **J5** & **J6** normally should be open except if you are in the A0 address function mode.

1. Run the SensorEval program by either double-clicking on desktop icon or by selecting Start, Program Files, National Semiconductor, National SensorEval.
2. Plug in the cable on the PC then on J3 connector of the LMP5235EVAL board.
3. Follow the register setups shown below. Make sure that you are following the given procedure for the specific evaluation board you are using.
4. Refer to the electrical schematic, layout and connector diagrams for proper connections to the external remote diodes.
5. **3.2** Install the SensorEval software (see Section 2.1).
6. Connect the USB cable between the PC or notebook computer and the LM95235EVAL board as shown if Figure 3 above.
7. Run the SensorEval software by either clicking on the desktop icon or by selecting Start, Programs, National Semiconductor, SensorEval, National SensorEval. The first screen should look like Figure 4 below:

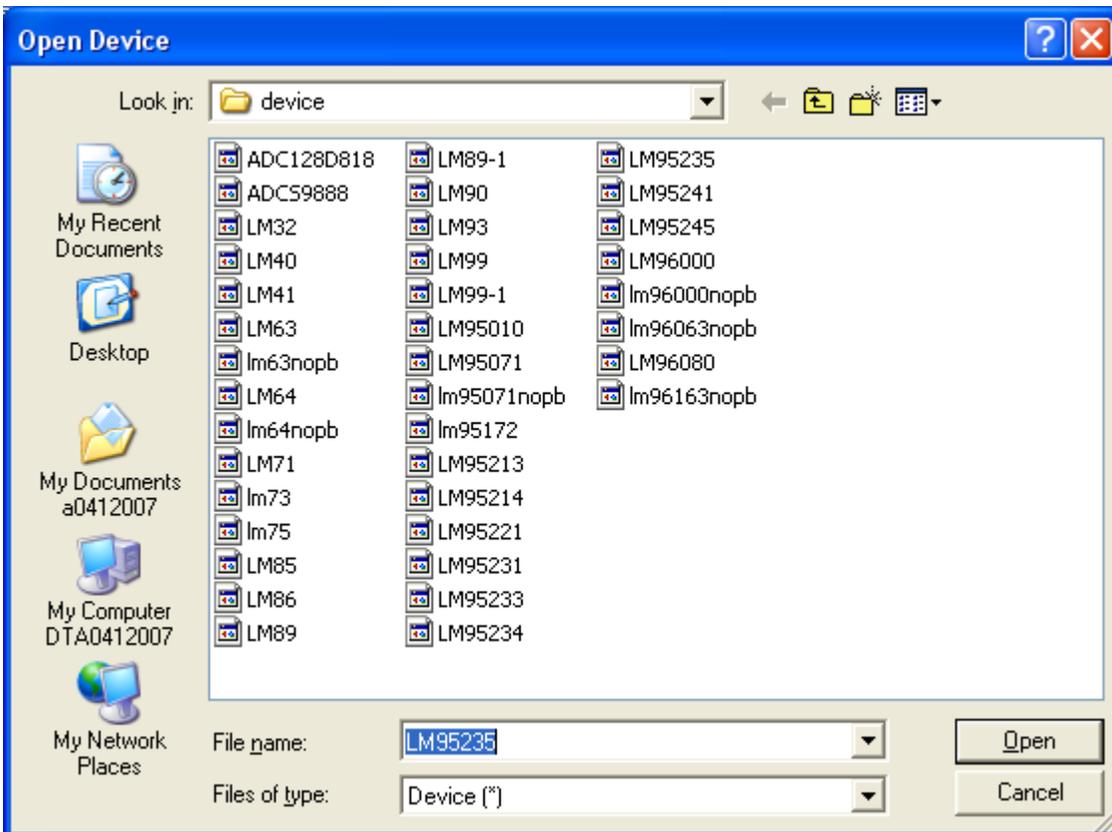


Figure 4

- Select LM95235 and click on the Open button. The next screen (first screen after the first time you run the program) will look like this Figure 5



Figure 5

- Select the LM95235 Evaluation Board then click the OK button.
- The next screen will look like Figure 6 below.

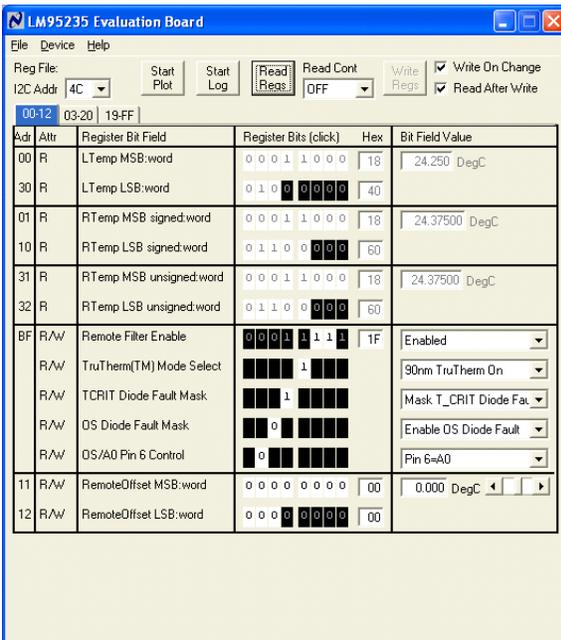


Figure 6

11. Select “Read Cont” down arrow and select “All Regs” from the pull down menu. Click on the “Read Regs” button.
12. The next screen will look like Figure 7.

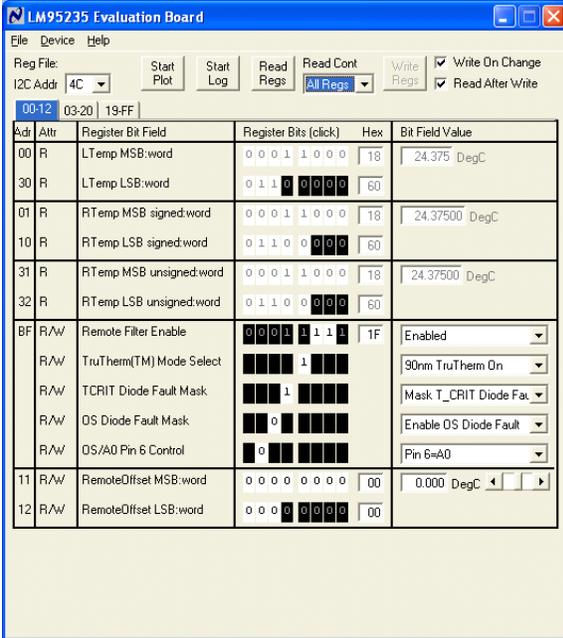


Figure 7

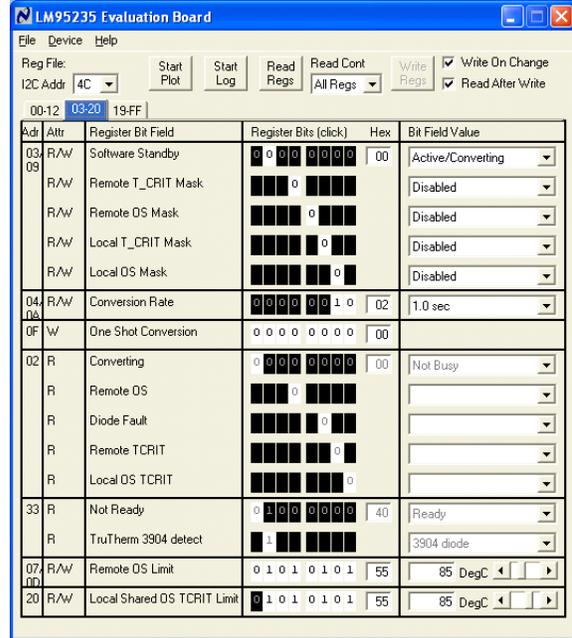


Figure 8

13. Local (on-chip) and remote temperatures should now read continuously.
14. If the user clicks the 03-20 tab the next screen will look like Figure 8. By turning on or off the filters, and/or changing the models, and/or changing the TruTherm controls the user can experiment with the effects of the temperature readings as shown in Figure 9 and Figure 10 below.

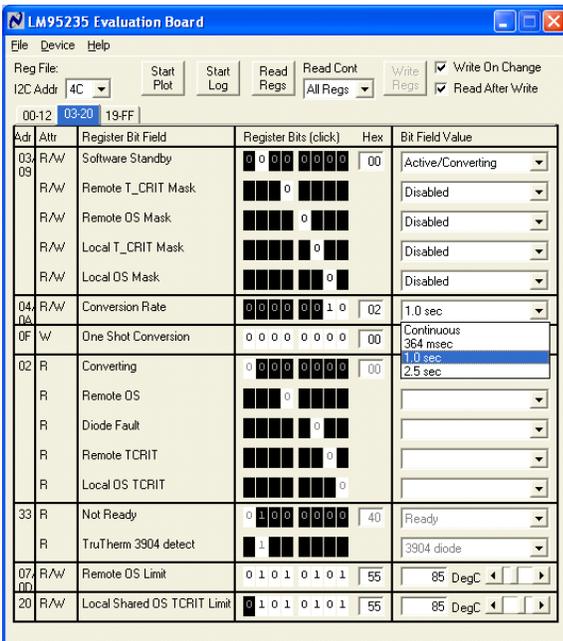


Figure 9

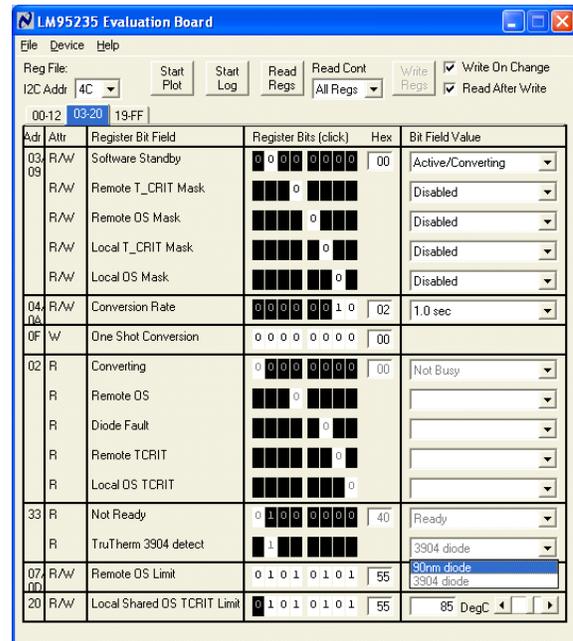


Figure 10

Setup

- If the user clicks on the Start Plot button, a graph will appear and will graph the temperature as shown in Figure 11 below.

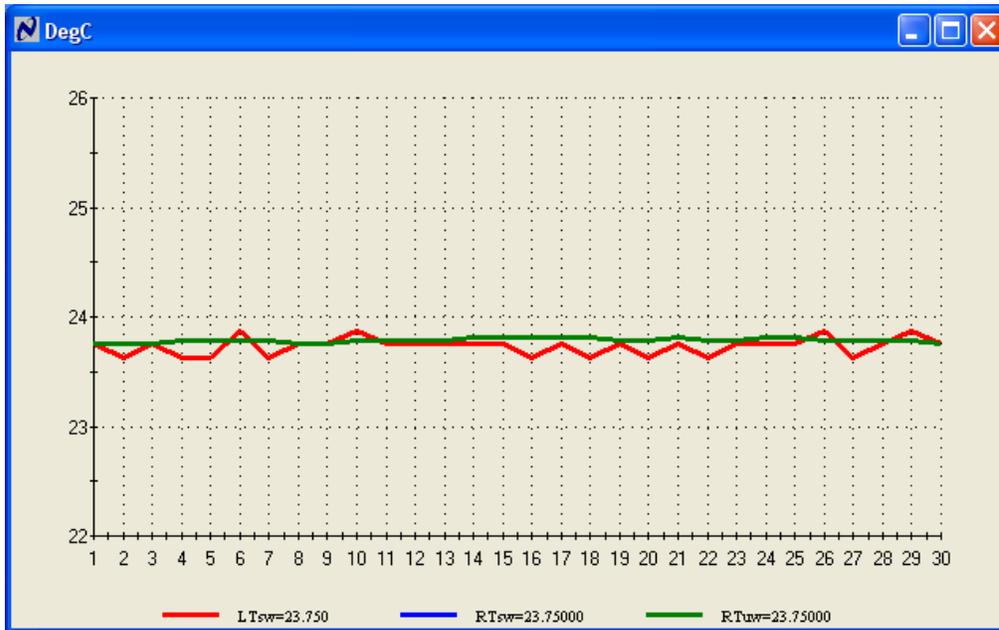


Figure 11

- The graph will run continuously until you press the “Stop Plot” button.
- At the same time you can also press the “Start Log” button to capture temperature data in a log file. Press the “Stop Log” button to stop data logging and capture the file. Press the “File” then “View Log” in the pull down menu to see the log file as shown in Figure 12 below.

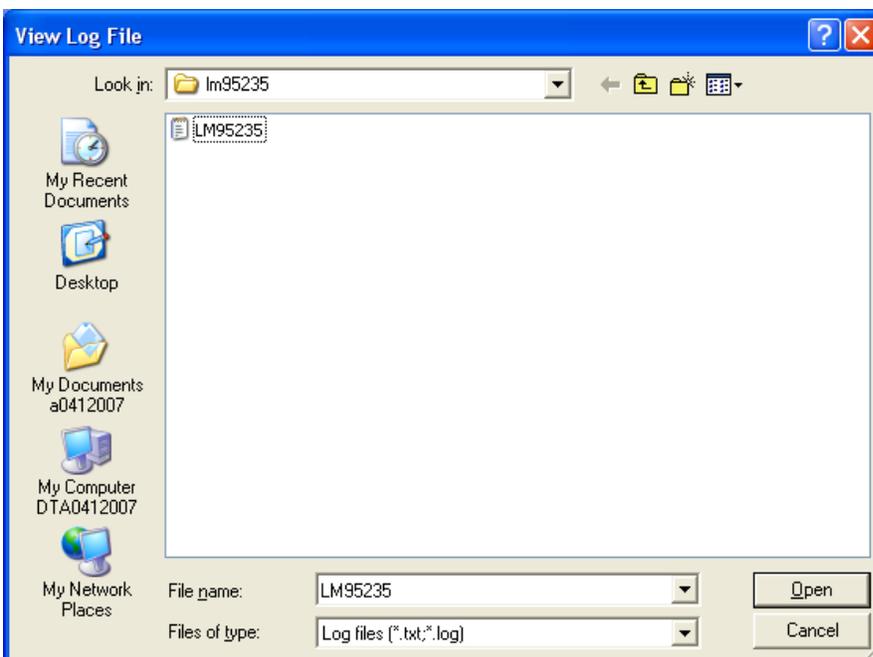


Figure 12

Table 2: Jumper Configurations and Header Pin Output Signals

Connector Label	Pin Number	Description		
J3	N/A	USB Cable Input. Connect the USB cable to this jack <i>after</i> the SensorEval software has been loaded on the PC.		
JP2 Output header provides user with signals for test purposes only. <i>Do not apply any external power or signals to any of the pins on these headers!</i>	1	V _{DD} . The +3.3 VDC voltage supplied by the on-board voltage regulator to the LM95235 V _{DD} input pin. Do not connect an external power supply to this pin!		
	2	SMBCLK. Clock signal for SMBus.		
	3	SMBDAT. Data signal for the SMBus.		
	4	ALERT#/OS#/A0 For the LM95235 this pin can be set to either the ALERT# function or the AO Address Select function.		
	5	TCrit#. This is the Active Low Open Drain pin which indicates that the Temperature limit has been exceeded.		
	6	GND. System ground.		
J4 Connection to temperature diodes <i>Do not apply any external power or signals to any of the pins on these headers!</i>	1,2	Connect for D+ connection		
	3,4	Connect for D- connection		
J5, J6 These are jumpered as indicated if the LM95235 is in the A0 Address Select function mode.		J5 Jumper	J6 Jumper	A0 Address Select, Hex
		NO	NO	Hi = 4C
		NO	YES	Mid = 29
		YES	Don't Care	Low = 18

1. Board Layout

Figure 13, Figure 14 and Figure 15 shows the board layout for the LM95235EVAL. The Eval Board offers resistors, capacitors and jumpers to display the temperatures.

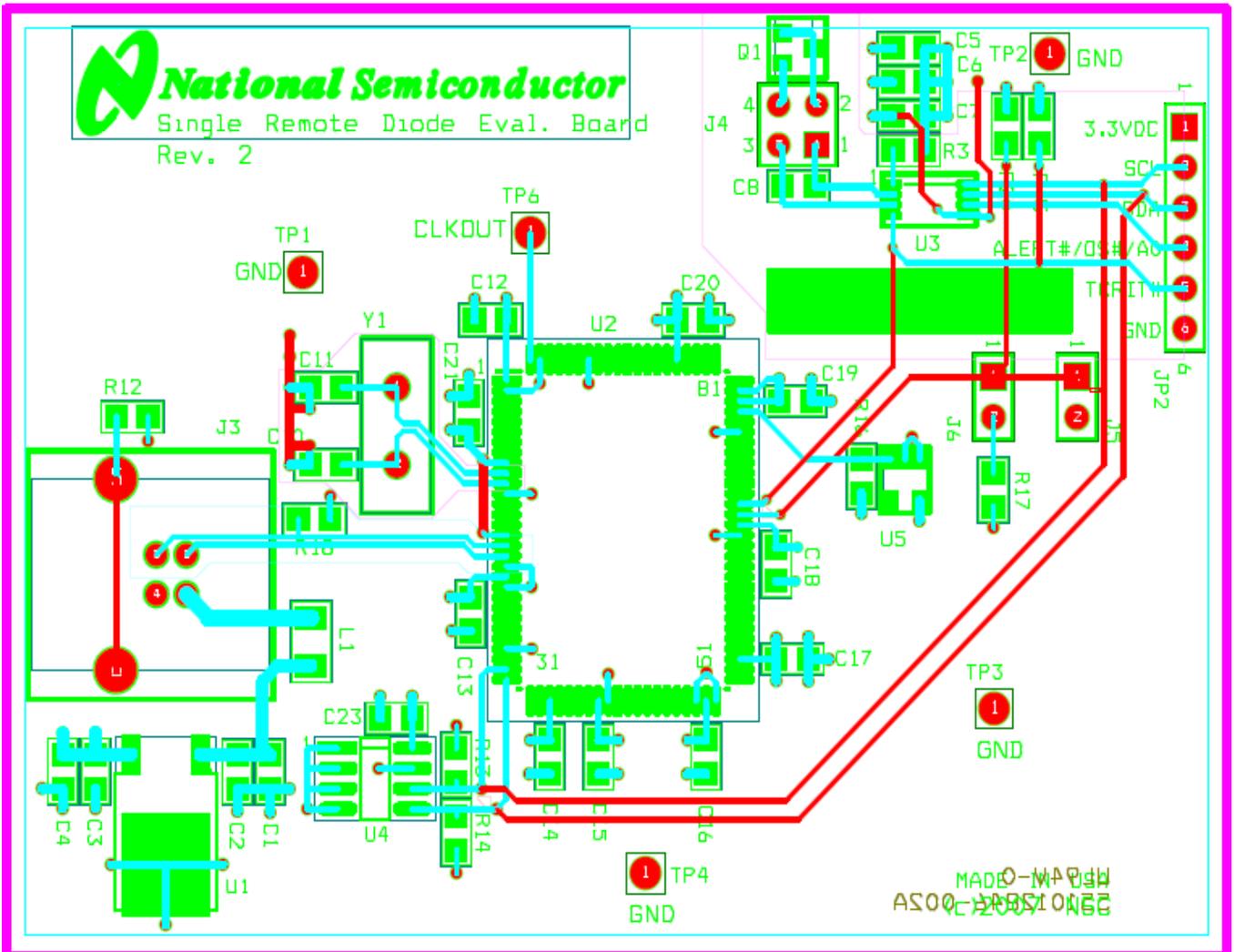


Figure 13: Top Assembly Layer

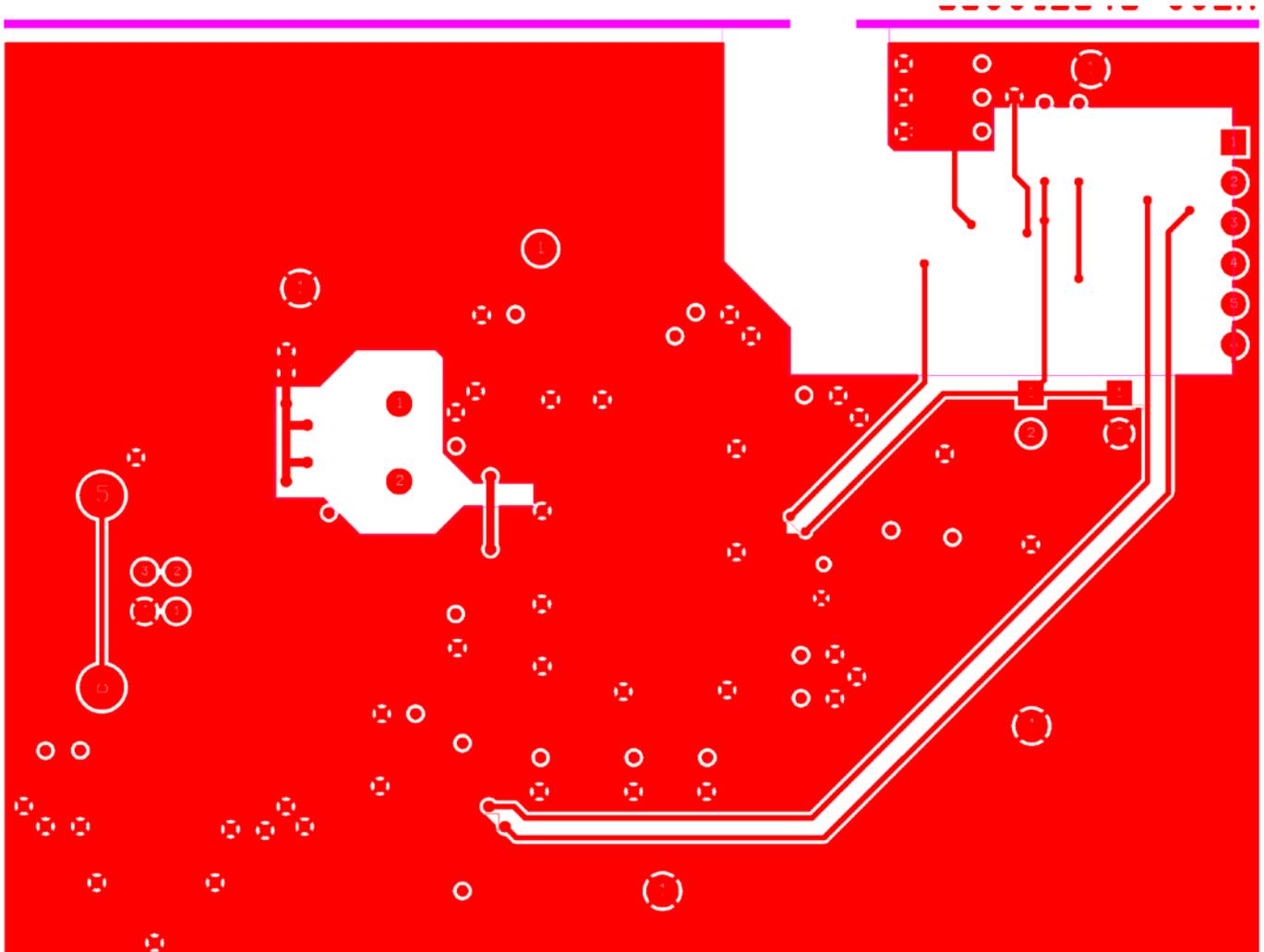


Figure 14: Top Layer Routing

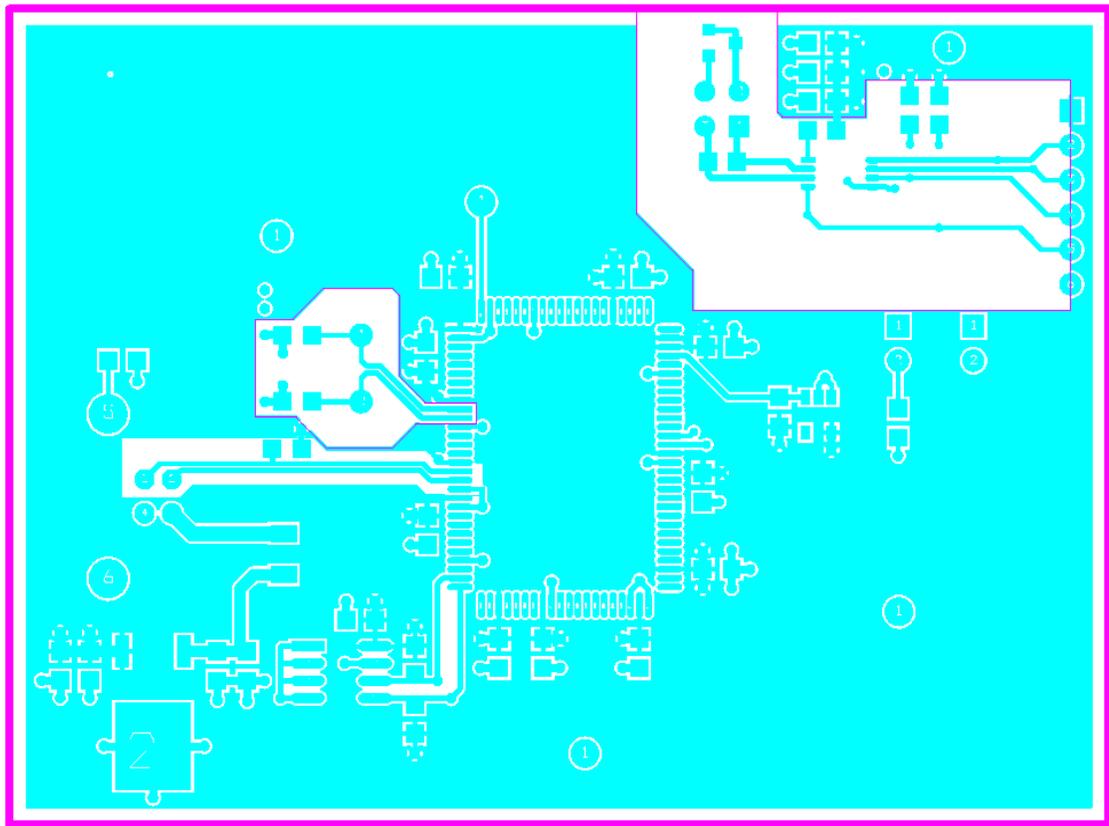


Figure 15: Bottom Layer Routing

Table 3: LM95235EVAL Bill of Materials

TEXAS INSTRUMENTS

				Single Remote Diode Temperature Sensor Eval Board		Created: March 23, 2007 Last Updated: August 21, 2012		Board Layout Revision:1.0 Schematic Revision: 1.0	
Item	NSC	Qty	Build	Part Reference	Value	Footprint	Manufacturer		
SMT Capacitors									
1		3		C1,C3, C5	2.2 uF	c3216	Kemet		
2		14		C2,C4,C6,C12,C13,C14,C15,C16	10 nF	c0805	Panasonic		
				C17,C18,C19,C20,C21,C23					
3		1		C7	100 pF	c0805			
4a		1		C8 (for LM95235 only)	100 pF	c0805			
4b		1		C8 (For all others)	2.2 nF	c0805			
5		2		C10,C11	12 pF	c1206	Kemet		
Connectors									
6		1		J3	Connector, USB-B	usb-jack-b	Mill-Max		
7		1		J4	CONN, 2X2 Headers, 0.1 in centers	th 4_hdr1x4_m_str_100	Sullins		
8		2		J5, J6	CONN, 1X2 Headers, 0.1 in centers	TP40	Sullins		
9		1		JP2	CONN, 1X6 Headers, 0.1 in centers	TP40	Sullins		
10		4		TP1, TP2, TP3, TP4, TP6	CONN, 1X1 Headers, 0.1 in centers	TP40	Sullins		
Ferrites									
11		1	10	L1	CM CHOKE		Steward		
Resistors									
12		3		R2,R15,R17	3.3K	r0805	Panasonic		
13		1		R3	0	r0805	Susumu Co Ltd		
14		1		R12	1 Meg	r0805	Panasonic		
15		2		R13,R14	1.5K	r0805	Panasonic		
IC's									
18		1		U1	LP2950CDT-3.3/TO252	TO263_7P	National Semiconductor		
19		1		U2	Cypress CY7C68013A-100AXC	100tqfp	Cypress		
20		1		U3	Device Under Test (DUT)	msop8	National Semiconductor		
21		1		U4	24C02	soic8	Atmel		
22		1		U5	LM3722	SOT23-stx	National Semiconductor		
Transistors									
22		1		Q1	MMBT3904/SOT	SOT23-stx	On Electronics		
Misc									
23		1		BOARD	Single Remote Diode Temp Sensor Eval Board Rev 1.0	1420X Rev 1.0	Advanced Circuits		
24		1		Y2	24 MHz	hc49us	ECS Inc.		
DO NOT SOLDER THE FOLLOWING TO BOARD									
25		1		R18 (for USB 1.1 only)	1.5K	r0805	Panasonic		
25		1		R16	10K	r0805	Panasonic		

NOTES

EVALUATION BOARD/KIT/MODULE (EVM) ADDITIONAL TERMS

Texas Instruments (TI) provides the enclosed Evaluation Board/Kit/Module (EVM) under the following conditions:

The user assumes all responsibility and liability for proper and safe handling of the goods. Further, the user indemnifies TI from all claims arising from the handling or use of the goods.

Should this evaluation board/kit not meet the specifications indicated in the User's Guide, the board/ kit may be returned within 30 days from the date of delivery for a full refund. THE FOREGOING LIMITED WARRANTY IS THE EXCLUSIVE WARRANTY MADE BY SELLER TO BUYER AND IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED, IMPLIED, OR STATUTORY, INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE. EXCEPT TO THE EXTENT OF THE INDEMNITY SET FORTH ABOVE, NEITHER PARTY SHALL BE LIABLE TO THE OTHER FOR ANY INDIRECT, SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES.

Please read the User's Guide and, specifically, the Warnings and Restrictions notice in the User's Guide prior to handling the product. This notice contains important safety information about temperatures and voltages. For additional information on TI's environmental and/or safety programs, please visit www.ti.com/esh or contact TI.

No license is granted under any patent right or other intellectual property right of TI covering or relating to any machine, process, or combination in which such TI products or services might be or are used. TI currently deals with a variety of customers for products, and therefore our arrangement with the user is not exclusive. TI assumes no liability for applications assistance, customer product design, software performance, or infringement of patents or services described herein.

Mailing Address: Texas Instruments Post Office Box 655303 Dallas, Texas 75265

Copyright 2012, Texas Instruments Incorporated

REGULATORY COMPLIANCE INFORMATION

As noted in the EVM User's Guide and/or EVM itself, this EVM and/or accompanying hardware may or may not be subject to the Federal Communications Commission (FCC) and Industry Canada (IC) rules.

For EVMs **not** subject to the above rules, this evaluation board/kit/module is intended for use for ENGINEERING DEVELOPMENT, DEMONSTRATION OR EVALUATION PURPOSES ONLY and is not considered by TI to be a finished end product fit for general consumer use. It generates, uses, and can radiate radio frequency energy and has not been tested for compliance with the limits of computing devices pursuant to part 15 of FCC or ICES-003 rules, which are designed to provide reasonable protection against radio frequency interference. Operation of the equipment may cause interference with radio communications, in which case the user at his own expense will be required to take whatever measures may be required to correct this interference.

General Statement for EVMs including a radio

User Power/Frequency Use Obligations: This radio is intended for development/professional use only in legally allocated frequency and power limits. Any use of radio frequencies and/or power availability of this EVM and its development application(s) must comply with local laws governing radio spectrum allocation and power limits for this evaluation module. It is the user's sole responsibility to only operate this radio in legally acceptable frequency space and within legally mandated power limitations. Any exceptions to this is strictly prohibited and unauthorized by Texas Instruments unless user has obtained appropriate experimental/development licenses from local regulatory authorities, which is responsibility of user including its acceptable authorization.

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

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

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.

For EVMs annotated as IC – INDUSTRY CANADA Compliant

This Class A or B digital apparatus complies with Canadian ICES-003.

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

Concerning EVMs including radio transmitters

This device complies with Industry Canada licence-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.

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.

~

Cet appareil numérique de la classe A ou B est conforme à la norme NMB-003 du Canada.

Les changements ou les modifications pas expressément approuvés par la partie responsable de la conformité ont pu vider l'autorité de l'utilisateur pour actionner l'équipement.

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.

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.

Important Notice for Users of this Product in Japan]

This development kit is NOT certified as Confirming to Technical Regulations of Radio Law of Japan!

If you use this product in Japan, you are required by Radio Law of Japan to follow the instructions below with respect to this product:

(1) Use this product 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 this product only after you obtained the license of Test Radio Station as provided in Radio Law of Japan with respect to this product, or

(3) Use of this product only after you obtained the Technical Regulations Conformity Certification as provided in Radio Law of Japan with respect to this product.

Also, please do not transfer this product, unless you give the same notice above to the transferee.

Please note that if you could not follow the instructions above, you will be subject to penalties of Radio Law of Japan.

Texas Instruments Japan Limited
(address) 24-1, Nishi-Shinjuku 6 chome, Shinjuku-ku, Tokyo, Japan

<http://www.tij.co.jp>

【ご使用にあたっての注意】

本開発キットは技術基準適合証明を受けておりません。

本製品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なります。

上記を遵守頂けない場合は、電波法の罰則が適用される可能性があることをご留意ください。

日本テキサス・インスツルメンツ株式会社
東京都新宿区西新宿6丁目24番1号
西新宿三井ビル
<http://www.tij.co.jp>

EVALUATION BOARD/KIT/MODULE (EVM)

WARNINGS, RESTRICTIONS AND DISCLAIMERS

For Feasibility Evaluation Only, in Laboratory/Development Environments. Unless otherwise indicated, this EVM is not a finished electrical equipment and not intended for consumer use. It is intended solely for use for preliminary feasibility evaluation in laboratory/development environments by technically qualified electronics experts who are familiar with the dangers and application risks associated with handling electrical mechanical components, systems and subsystems. It should not be used as all or part of a finished end product.

Your Sole Responsibility and Risk. You acknowledge, represent and agree that:

1. You have unique knowledge concerning Federal, State and local regulatory requirements (including but not limited to Food and Drug Administration regulations, if applicable) which relate to your products and which relate to your use (and/or that of your employees, affiliates, contractors or designees) of the EVM for evaluation, testing and other purposes.
2. You have full and exclusive responsibility to assure the safety and compliance of your products with all such laws and other applicable regulatory requirements, and also to assure the safety of any activities to be conducted by you and/or your employees, affiliates, contractors or designees, using the EVM. Further, you are responsible to assure 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.
3. You will employ reasonable safeguards to ensure that your use of the EVM will not result in any property damage, injury or death, even if the EVM should fail to perform as described or expected.
4. You will take care of proper disposal and recycling of the EVM's electronic components and packing materials.

Certain Instructions. It is important to operate this EVM within TI's recommended specifications and environmental considerations per the user guidelines. Exceeding the specified EVM ratings (including but not limited to input and output voltage, current, power, and environmental ranges) may cause property damage, personal injury or death. If there are questions concerning these ratings please 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 result in unintended and/or inaccurate operation and/or possible permanent damage to the EVM and/or interface electronics. Please consult the EVM User's 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, some circuit components may have case temperatures greater than 60°C as long as the input and output are maintained at a normal ambient operating temperature. These components include but are not limited to linear regulators, switching transistors, pass transistors, and current sense resistors which can be identified using the EVM schematic located in the EVM User's Guide. When placing measurement probes near these devices during normal operation, please be aware that these devices may be very warm to the touch. As with all electronic evaluation tools, only qualified personnel knowledgeable in electronic measurement and diagnostics normally found in development environments should use these EVMs.

Agreement to Defend, Indemnify and Hold Harmless. You agree to defend, indemnify and hold TI, its licensors and their representatives harmless from and against any and all claims, damages, losses, expenses, costs and liabilities (collectively, "Claims") arising out of or in connection with any use of the EVM that is not in accordance with the terms of the agreement. This obligation shall apply whether Claims arise under law of tort or contract or any other legal theory, and even if the EVM fails to perform as described or expected.

Safety-Critical or Life-Critical Applications. If you intend to evaluate the components for possible use in safety critical applications (such as life support) where a failure of the TI product would reasonably be expected to cause severe personal injury or death, such as devices which are classified as FDA Class III or similar classification, then you must specifically notify TI of such intent and enter into a separate Assurance and Indemnity Agreement.

IMPORTANT NOTICE

Texas Instruments Incorporated and its subsidiaries (TI) reserve the right to make corrections, modifications, enhancements, improvements, and other changes to its products and services at any time and to discontinue any product or service without notice. Customers should obtain the latest relevant information before placing orders and should verify that such information is current and complete. All products are sold subject to TI's terms and conditions of sale supplied at the time of order acknowledgment.

TI warrants performance of its hardware products to the specifications applicable at the time of sale in accordance with TI's standard warranty. Testing and other quality control techniques are used to the extent TI deems necessary to support this warranty. Except where mandated by government requirements, testing of all parameters of each product is not necessarily performed.

TI assumes no liability for applications assistance or customer product design. Customers are responsible for their products and applications using TI components. To minimize the risks associated with customer products and applications, customers should provide adequate design and operating safeguards.

TI does not warrant or represent that any license, either express or implied, is granted under any TI patent right, copyright, mask work right, or other TI intellectual property right relating to any combination, machine, or process in which TI products or services are used. Information published by TI regarding third-party products or services does not constitute a license from TI to use such products or services or a warranty or endorsement thereof. Use of such information may require a license from a third party under the patents or other intellectual property of the third party, or a license from TI under the patents or other intellectual property of TI. Reproduction of information in TI data books or data sheets is permissible only if reproduction is without alteration and is accompanied by all associated warranties, conditions, limitations, and notices.

Reproduction of this information with alteration is an unfair and deceptive business practice. TI is not responsible or liable for such altered documentation. Resale of TI products or services with statements different from or beyond the parameters stated by TI for that product or service voids all express and any implied warranties for the associated TI product or service and is an unfair and deceptive business practice. TI is not responsible or liable for any such statements.

TI products are not authorized for use in safety-critical applications (such as life support) where a failure of the TI product would reasonably be expected to cause severe personal injury or death, unless officers of the parties have executed an agreement specifically governing such use. Buyers represent that they have all necessary expertise in the safety and regulatory ramifications of their applications, and acknowledge and agree that they are solely responsible for all legal, regulatory and safety-related requirements concerning their products and any use of TI products in such safety-critical applications, notwithstanding any applications-related information or support that may be provided by TI. Further, Buyers must fully indemnify TI and its representatives against any damages arising out of the use of TI products in such safety-critical applications.

TI products are neither designed nor intended for use in military/aerospace applications or environments unless the TI products are specifically designated by TI as military-grade or "enhanced plastic." Only products designated by TI as military-grade meet military specifications. Buyers acknowledge and agree that any such use of TI products which TI has not designated as military-grade is solely at the Buyer's risk, and that they are solely responsible for compliance with all legal and regulatory requirements in connection with such use.

TI products are neither designed nor intended for use in automotive applications or environments unless the specific TI products are designated by TI as compliant with ISO/TS 16949 requirements. Buyers acknowledge and agree that, if they use any non-designated products in automotive applications, TI will not be responsible for any failure to meet such requirements.

Following are URLs where you can obtain information on other Texas Instruments products and application solutions:

Products

Amplifiers	amplifier.ti.com
Data Converters	dataconverter.ti.com
DSP	dsp.ti.com
Interface	interface.ti.com
Logic	logic.ti.com
Power Mgmt	power.ti.com
Microcontrollers	microcontroller.ti.com
RFID	ti-rfid.com
Low Power	ti.com/lpw
Wireless	

Applications

Audio	ti.com/audio
Automotive	ti.com/automotive
Broadband	ti.com/broadband
Digital Control	ti.com/digitalcontrol
Military	ti.com/military
Optical Networking	ti.com/opticalnetwork
Security	ti.com/security
Telephony	ti.com/telephony
Video & Imaging	ti.com/video
Wireless	ti.com/wireless

Mailing Address: Texas Instruments, Post Office Box 655303, Dallas, Texas 75265

Copyright © 2007, Texas Instruments Incorporated