EV2400 EVM Interface Board

This user's guide describes the function and operation of the EV2400 evaluation module interface board. A complete description, as well as the bill of materials and schematic are included.

Contents

List of Figures

List of Tables

Trademarks

Windows is a registered trademark of Microsoft.

1 Introduction

The EV2400 EVM interface board enables an IBM-compatible or other type PC (with the required driver for its particular platform) to communicate with the Texas Instruments SMBus and I^2C interface gas gauges via a Universal Serial Bus (USB) port. In addition to this board, PC software is required to interpret the gas gauge data to complete the evaluation system.

1.1 Features

- Fully powered from the USB port
- Optional 5-V port for powering high-power voltage drivers (future upgrade)
- Complete interface between the USB and SMBus or I^2C interfaces using a simple API
- Expansion port for future upgrades

1.2 Kit Contents

- EV2400 circuit module
- Standard USB cable

1.3 Ordering Information

Table 1. Ordering Information

EVM Part Number
EV2400

2 Interfaces

The EV2400 interfaces are described in the following table. The reference designators on the circuit board and the functions are also listed.

Reference Designator	Function	Details
Port 1: SMB	SMBus Interface Port	Terminal block for connecting to a target device
Port 2: I2C	I^2C Interface Port	Terminal block for connecting to a target device
Port 3: HDQ	HDQ Interface Port	Terminal block for connecting to a target device
Port 4	Single Wire Port	Future expansion port
Port 5	GPIO Port	Future expansion port

2.1 Overview

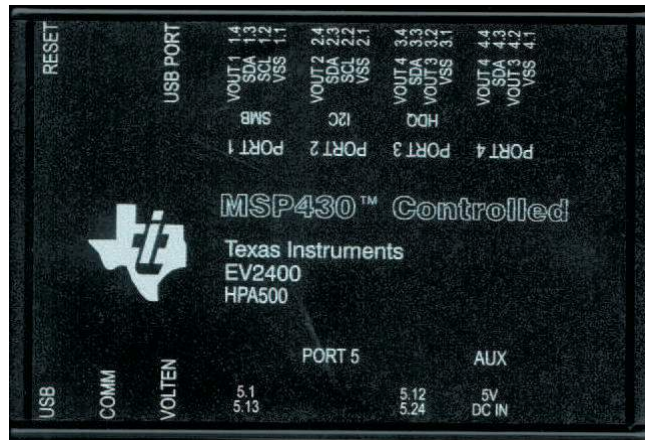The EV2400 ports are shown in Figure 1.

Figure 1. EV2400 Ports

NOTE: The additional power input 5-V port on the EV2400 must not be connected in normal operation. Normal operation uses power from the USB port.

2.2 EV2400 Controller

The EV2400 controller is an MSP430F5529 running at 4 MHz. The controller firmware is stored in flash memory and is executed by the core at power-up.

The controller communicates with target device(s) through either: a 2-wire SMBus communication port, a 2-wire EEPROM I²C port, or a single-wire HDQ port. The 2-wire SMBus communication port supports both SMBus and I²C protocols. CRC-8 checksum verification for the data packets prevents data corruption over the USB.

2.3 USB Interface (USB)

The interface board connects to a USB port (version 1.1 or later) on a host computer and is powered from the port. All communication over the USB is human Interface device (HID) class. Drivers are built into Windows® and most of the operating systems.

2.4 HDQ Interface (HDQ)

This interface allows a host computer to interact with an HDQ interface device such as a battery monitor device through a 1-wire HDQ interface. Connect the data and ground reference (VSS) to a target device.

Pin	Name	Description
3.1	VSS	Ground return/reference for HDQ interface.
3.2	VOUT 3	Optional voltage output (future expansion)
3.3	SDA	HDQ serial communication line. Pulled up to 3.3 V with a 10-kΩ resistor.
3.4	VOUT 4	Optional voltage output (future expansion)

2.5 I²C Interface (I²C)

This interface allows a host computer to interact with I²C interfaces, such as a battery monitor device and EEPROM through a 2-wire I²C interface. Connect the data, clock, and a ground reference (VSS) to a target device.

Pin	Name	Description
2.1	VSS	Ground return/reference for I^{2}C interface.
2.2	SCL	I^{2}C clock. Pulled up to 3.3 V with a 20-kΩ resistor. Uses bus acceleration in positive direction to allow for larger pullup.
2.3	SDA	I^{2}C data. Pulled up to 3.3 V with a 20-kΩ resistor. Uses bus acceleration in positive direction to allow for larger pullup.
2.4	VOUT 2	Optional voltage output (future expansion)

2.6 SMBus Interface (SMBus)

This interface allows a host computer to interact with an SMBus interface device such as a battery monitor device through a 2-wire SMBus interface. Connect the data, clock, and a ground reference (VSS) to a target device.

Pin	Name	Description
1.1	VSS	Ground return/reference for SMBus interface.
1.2	SCL	SMBus clock. Pulled up to 3.3 V with a 20-kΩ resistor. Uses bus acceleration in positive direction to allow for a larger pullup resistor.
1.3	SDA	SMBus data. Pulled up to 3.3 V with a 20-kΩ resistor. Uses bus acceleration in positive direction to allow for a larger pullup resistor.
1.4	VOUT 1	Optional voltage output (future expansion)

3 EV2400 Firmware Updater

To update the EV2400 to the latest firmware version, use the EV2400 Firmware Updater tool, which is located at http://www.ti.com/tool/ev2400, and follow these steps:

> **NOTE:** The Battery Management Studio (bqSTUDIO) tool helps to determine the current version of the EV2400 firmware (FW) installed on a machine. To find the current version, plug in the EV2400 to a computer that has bqSTUDIO installed. After bqSTUDIO starts, the FW version is displayed in the top of the dashboard window next to the USB cable icon.

1. Download the latest EV2400 Firmware Updater tool from http://www.ti.com/tool/ev2400.
2. Open the archive with the update tool installer, and copy its contents to a temporary directory.
3. Run the installer. Take note of the location where the Firmware Updater tool is installed on the computer.
4. Connect the EV2400 that is to be updated to the computer with the EV2400 Firmware Updater tool.

> **NOTE:** The EV2400 should remain plugged into the computer until the update is completed.

5. Ensure that no other EV2300 or EV2400 is connected to the computer being used for the firmware update.
6. Go to the location of the Firmware Updater tool installed doing Step 3.
7. Run the Firmware Updater tool.
8. The updater tool should detect the connected EV2400, display the current firmware version, and prompt the user to continue to update the EV2400 firmware. See Figure 2.
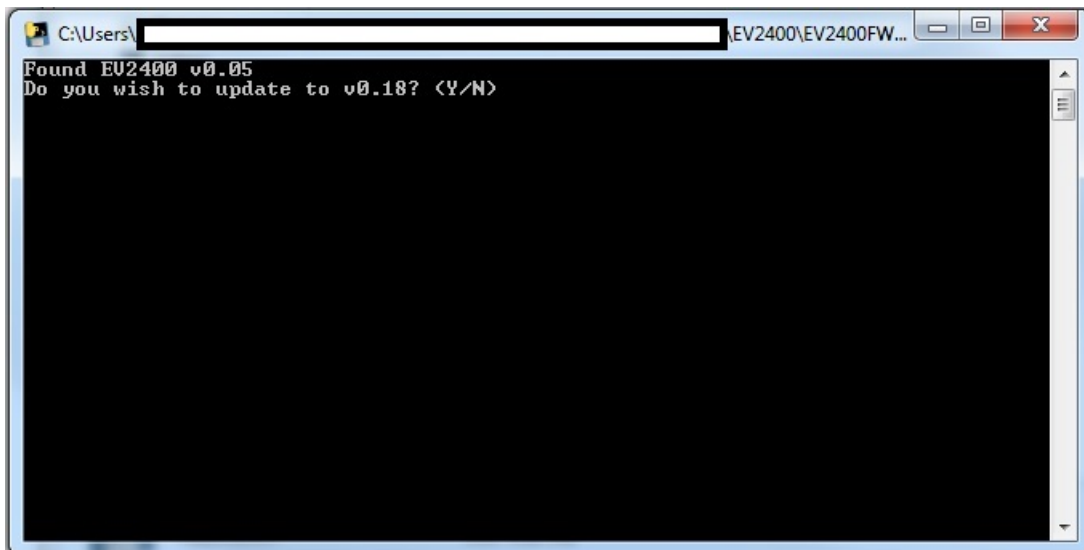
Figure 2. Firmware Update Prompt Screen

9. Type **Y** and press **Enter**.

10. The Firmware Updater tool should place the EV2400 into FW Update mode, perform a mass erase of the older EV2400 version's firmware, program the EV2400, and then reset the device. The tool will prompt the user to continue when finished. See Figure 3.
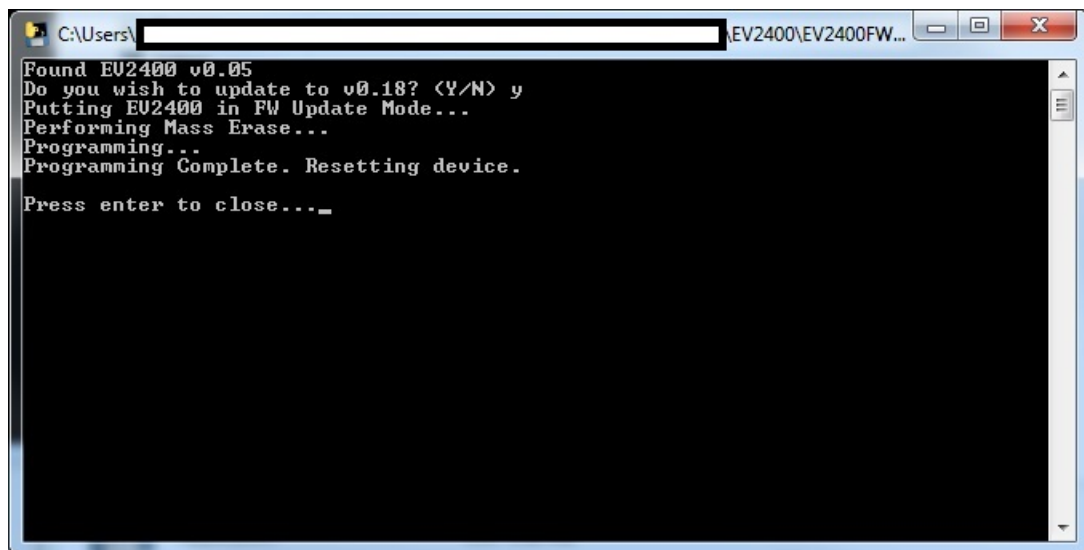

Figure 3. Update Complete Screen

11. Press **Enter** to close the Firmware Updater tool.

> **NOTE:** If during the update the EV2400 is disconnected, it is possible for the MSP on the EV2400 to remain in FW update mode. To update the device in this mode, run the Firmware Upgrader tool at the command line with the '-s' option (for example, EV2400_Updater_v0028.exe -s).

4   EV2400 Bill of Materials, Component Placement, Schematic

This chapter includes the bill of materials, component placement on the circuit board, and schematic for the EV2400 EVM.

4.1   *Bill of Materials (BOM)*

Count	Reference Design	Value	Description	Size	Part Number	Manufacturer
31	C1, C2, C3, C4, C5, C6, C7, C11, C13, C15, C16, C18, C19, C20, C21, C22, C23, C24, C25, C26, C27, C28, C29, C30, C31, C32, C33, C34, C35, C38, C39	0.1 µF	Capacitor, Ceramic, 25 V, X7R, 20%	0603	STD	Any
1	C12	4.7 µF	Capacitor, Ceramic, 25 V, X7R, 20%	0805	STD	Any
1	C36	2.2 nF	Capacitor, Ceramic, 25 V, X7R, 20%	0603	STD	Any
2	C37, C41	220 pF	Capacitor, Ceramic, 50 V, C0G, 5%	0603	STD	Any
1	C40	470 nF	Capacitor, Ceramic, 25 V, X7R, 20%	0603	STD	Any
2	C42, C43	12 pF	Capacitor, Ceramic, 50 V, C0G, 10%	0603	STD	Any
2	C8, C10	2.2 µF	Capacitor, Ceramic, 25 V, X7R, 20%	0603	STD	Any
3	C9, C14, C17	10 µF	Capacitor, Tantalum, 10 µF, 10 V, 20%	3216	293D106X0010A2T	Vishay
6	D1, D2, D3, D4, D5, D6	GL05T	Diode, TVS diode, Low Capacitance	SOT23	GL05T	General
3	D7, D8, D9	SSF-LXH305GD-TR	Diode. LED, 2.6 V, 25 mA	0.250 x 0.250 inch	SSF-LXH305GD-TR	Lumex
1	J1	67068-1000	Connector, USB Upstream (Type B)	0.47 x 0.67 inch	67068-1000	Molex
4	J2, J3, J4, J5	22-05-3041	Header, Friction Lock Ass'y, 4-pin Right Angle,	0.400 x 0.500 inch	22-05-3041	Molex
1	J6	PEC12DBAN	Header, Right Angle, Male 2x12-pin, 100mil spacing (12-pin strip), right-angle	0.100 inch x 12 x 2	PEC12DBAN	Sullins
1	J7	RAPC 722	Connector, 2.1mm, DC Jack w/Switch, TH	0.57 x 0.35 inch	RAPC 722	Switchcraft
1	J8	22-23-2041	Header, 4-pin Friction Lock, 100-mil spacing	0.250 x 0.400 inch	22-23-2041	Molex
0	JP1, JP2, JP3, JP4, JP5, JP6	DNP	Header, 2-pin, 100-mil spacing	0.100 inch x 2	PEC02SAAN	Sullins
1	JP7	PEC02SAAN	Header, 2-pin, 100-mil spacing	0.100 inch x 2	PEC02SAAN	Sullins
6	Q1, Q2, Q3, Q4, Q5, Q6	BSS223PW	MOSFET, Pch, −20 V, −0.39 A, 1.2 Ω	SOT323	BSS223PW	Infineon
3	Q7, Q8, Q9	2N7002W	MOSFET, Nch, 60 V, 115 mA	SOT323 [SC70]	2N7002W	Diodes
1	R1	33 kΩ	Resistor, Chip, 1/16 W, 5%	0603	STD	Any
4	R10, R11, R13, R14	20 kΩ	Resistor, Chip, 1/16 W, 5%	0603	STD	Any

Count	Reference Design	Value	Description	Size	Part Number	Manufacturer
2	R2, R3	33 Ω	Resistor, Chip, 1/16 W, 5%	0603	STD	Any
1	R26	470 Ω	Resistor, Chip, 1/16 W, 1%	0603	STD	Any
1	R27	51 kΩ	Resistor, Chip, 1/16 W, 1%	0603	STD	Any
1	R28	100 kΩ	Resistor, Chip, 1/10 W, 1%	0603	STD	Any
3	R39, R40, R41	200 Ω	Resistor, Chip, 1/16 W, 5%	0603	STD	Any
1	R4	1.5 kΩ	Resistor, Chip, 1/16 W, 5%	0603	STD	Any
1	R42	47 kΩ	Resistor, Chip, 1/16 W, 5%	0603	STD	Any
3	R43, R44, R45	10 kΩ	Resistor, Chip, 1/10 W, 1%	0603	STD	Any
3	R46, R47, R48	100 kΩ	Resistor, Chip, 1/16 W, 5%	0603	STD	Any
21	R5, R6, R7, R12, R15, R16, R19, R20, R22, R24, R25, R29, R30, R31, R32, R33, R34, R35, R36, R37, R38	10 kΩ	Resistor, Chip, 1/16 W, 5%	0603	STD	Any
6	R8, R9, R17, R18, R21, R23	100 Ω	Resistor, Chip, 1/16 W, 5%	0603	STD	Any
1	SW1	EVQPSD02K	Switch, SMD Light-Touch, Side Operation	6.1 mm x 4.0 mm	EVQPSD02K	Panasonic
1	TP1	5VUSB	Test Point, Red, Thru Hole Color Keyed	0.100 x 0.100 inch	5000	Keystone
1	TP2	5VPLUG	Test Point, Red, Thru Hole Color Keyed	0.100 x 0.100 inch	5000	Keystone
1	TP3	3.3V	Test Point, Red, Thru Hole Color Keyed	0.100 x 0.100 inch	5000	Keystone
1	TP4	GND	Test Point, Black, Thru Hole Color Keyed	0.100 x 0.100 inch	5001	Keystone
1	U1	MSP430F5529IPN	IC, Mixed Signal Microcontroller	TQFP-80	MSP430F5529IPN	TI
6	U10, U11, U12, U13, U15, U18	TPS73601DBV	IC, Cap-Free, NMOS, 400mA LDO Regulator with Reverse Current Protection.	SOT23-5	TPS73601DBV	TI
1	U2	TPS2550DBV	IC, Power-Distribution Switch, Current-Limited	SOT-23-6	TPS2550DBV	TI
1	U3	TPS76333DBV	IC, Micro-Power 150-mA LDO Regulator	SOT23-5	TPS76333DBV	TI
3	U4, U5, U6	ST2329AQTR	IC, 2-bit dual supply level translator without direction control pin	10-QFN	ST2329AQTR	ST
1	U7	TPS79650DCQ	IC, Ultralow-Noise, High PSRR Fast RF, LDO, 1A, 5V	SOT223-6	TPS79650DCQ	TI

Count	Reference Design	Value	Description	Size	Part Number	Manufacturer
1	U8	TPS2113APW	IC, Auto Switching Power Mux, Rds 84 mΩ, 1A.	SO8	TPS2113APW	TI
2	U9, U14	ISL90842UIV1427Z	IC, Quad Digitally Controlled Potentiometers	TSSOP	ISL90842UIV1427Z	Intersil
1	Y1	4 MHz	Crystal, SMT Quartz Crystal	0.484 x 0.190 inch	ATS040SM	CTS
1	—		PCB		HPA500	Any
1			Plastic, Enclosure, Silkscreened, Two Custom end panels, screws		115574-501-000	PACTEC

Notes: 1. These assemblies are ESD sensitive, ESD precautions shall be observed.

2. These assemblies must be clean and free from flux and all contaminants. Use of no clean flux is not acceptable.

3. These assemblies must comply with workmanship standards IPC-A-610 Class 2.

4. Ref designators marked with an asterisk ('**') cannot be substituted. All other components can be substituted with equivalent manufacturers' components.
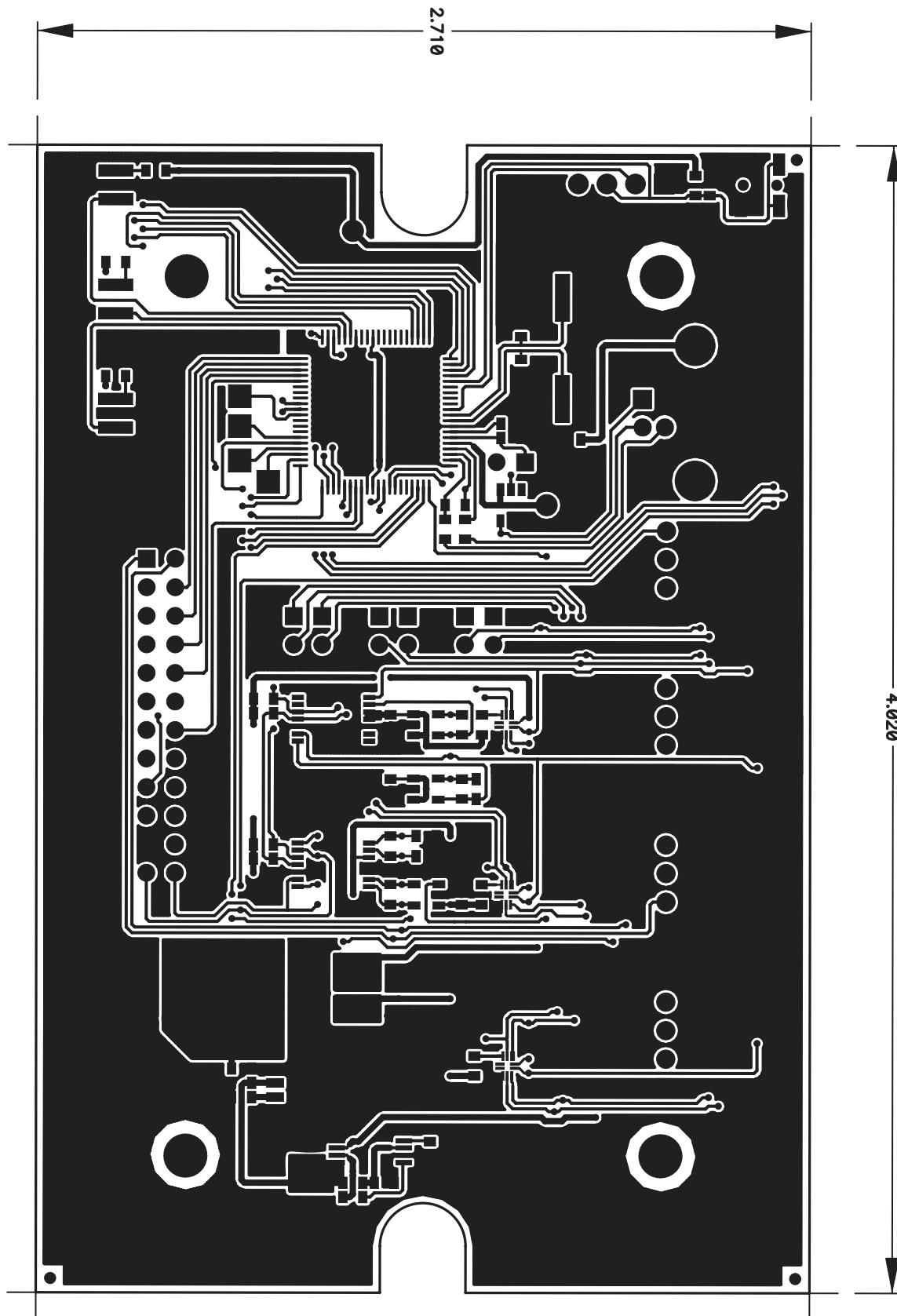
4.2   EV2400 Component Placement

Figure 4. Top Assembly

Copyright © 2011–2020, Texas Instruments Incorporated
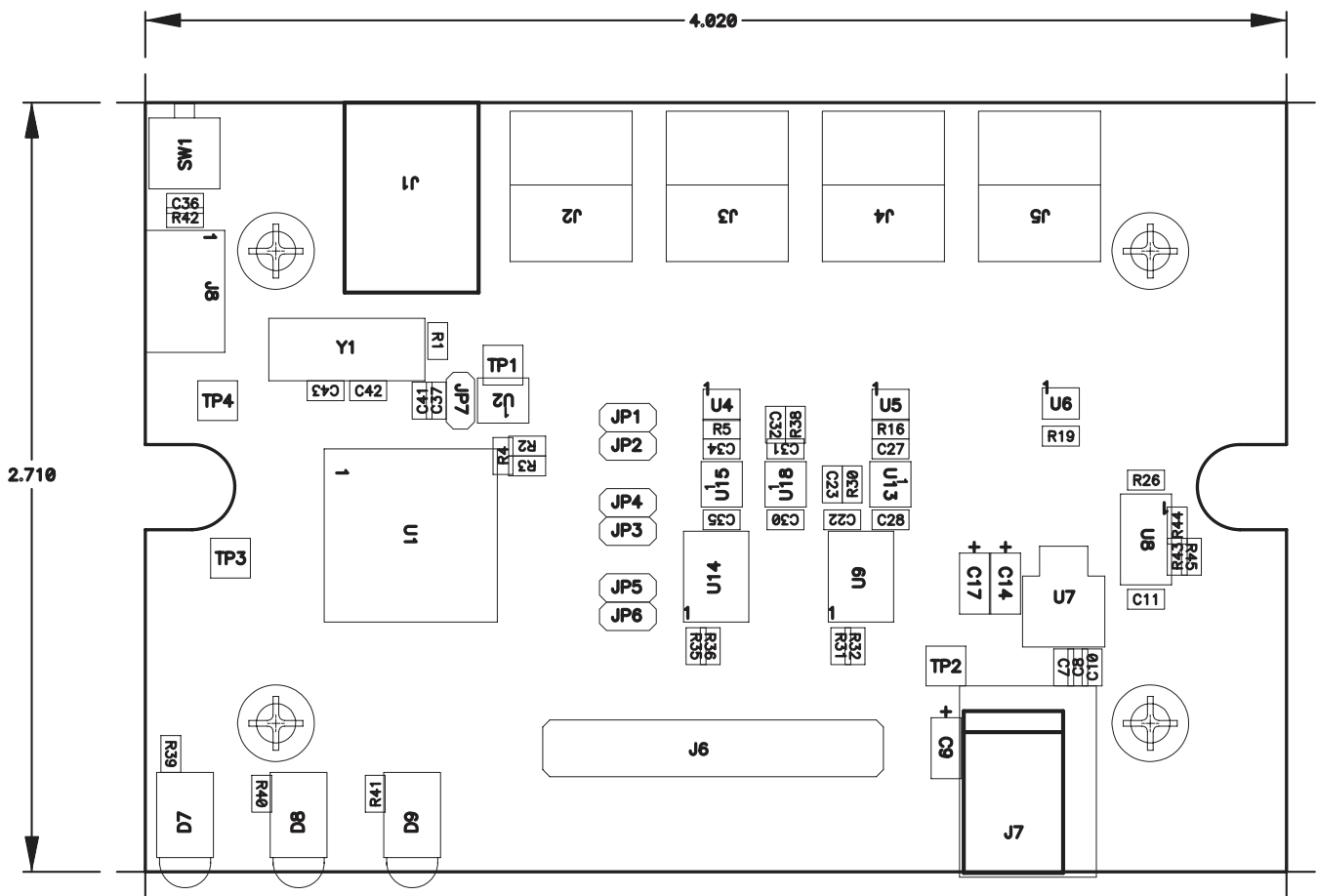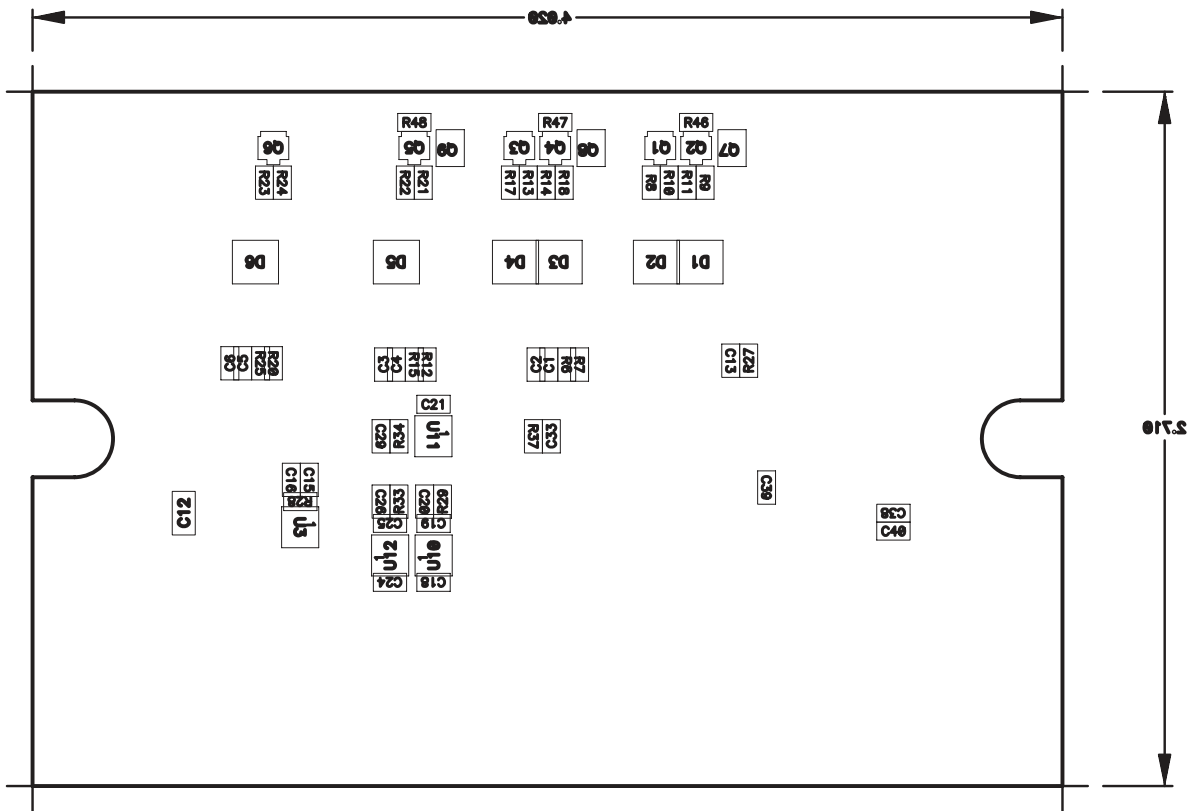
Figure 5. Bottom Assembly

Copyright © 2011–2020, Texas Instruments Incorporated
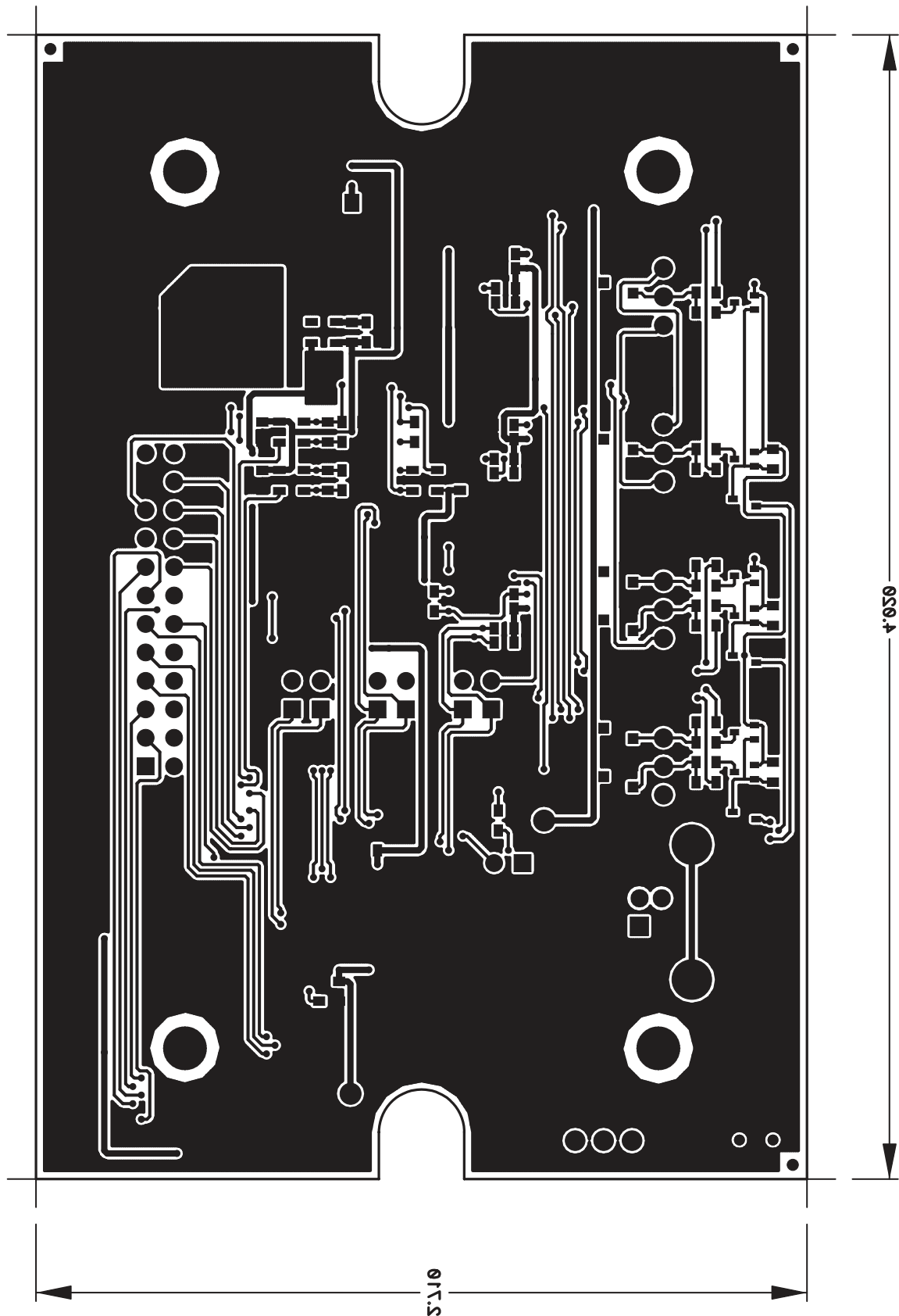
Figure 6. Board Layer 1
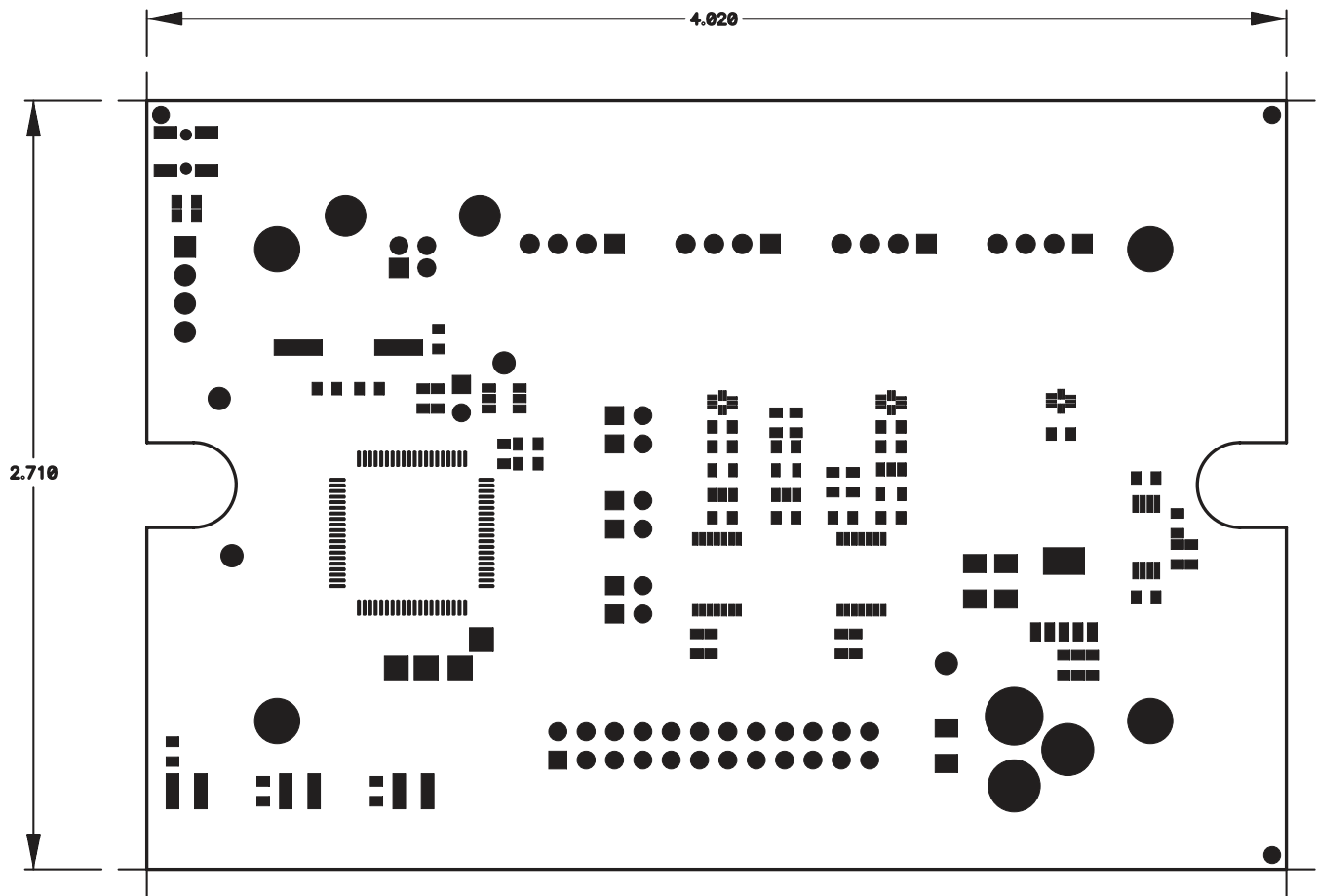
Figure 7. Board Layer 2
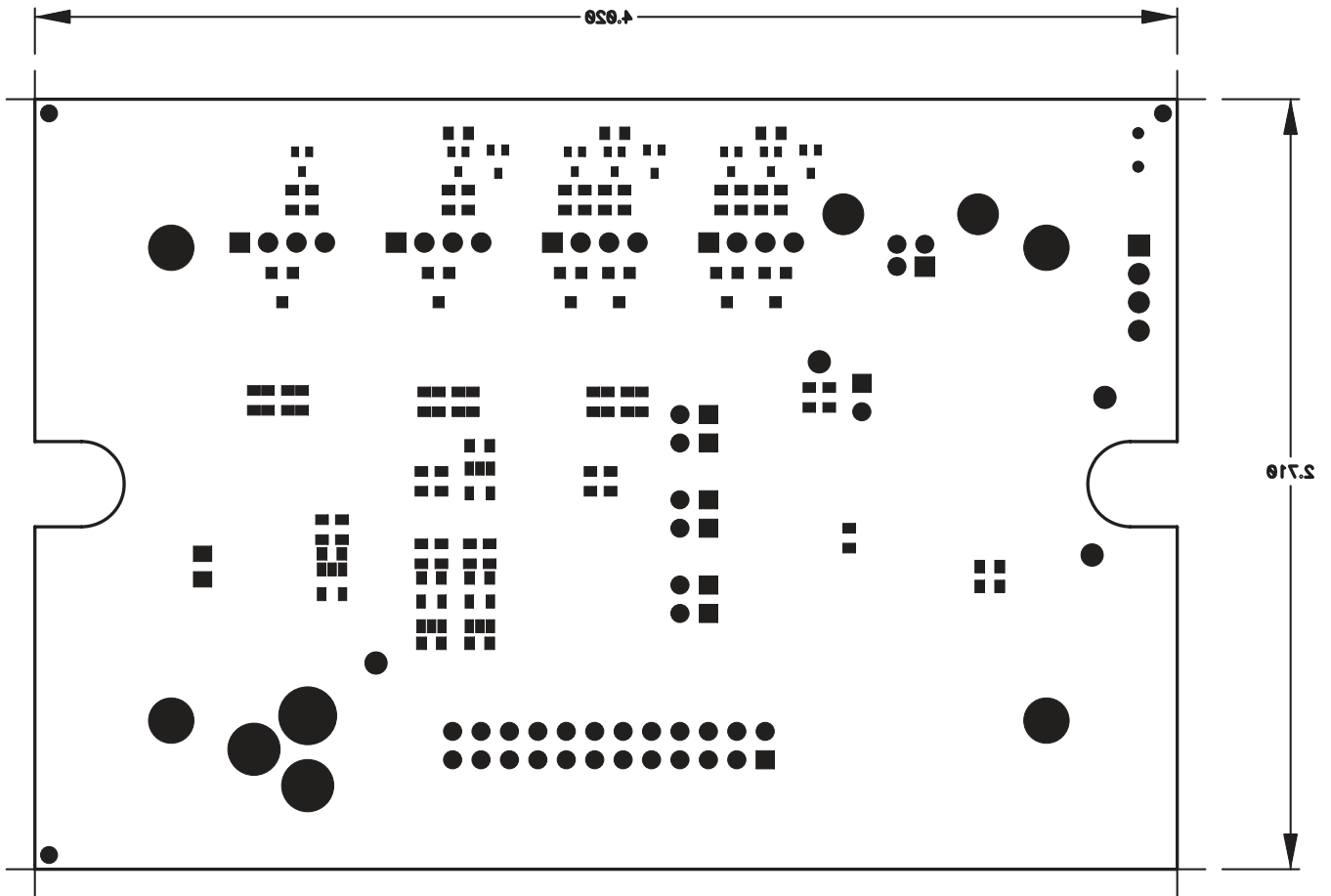
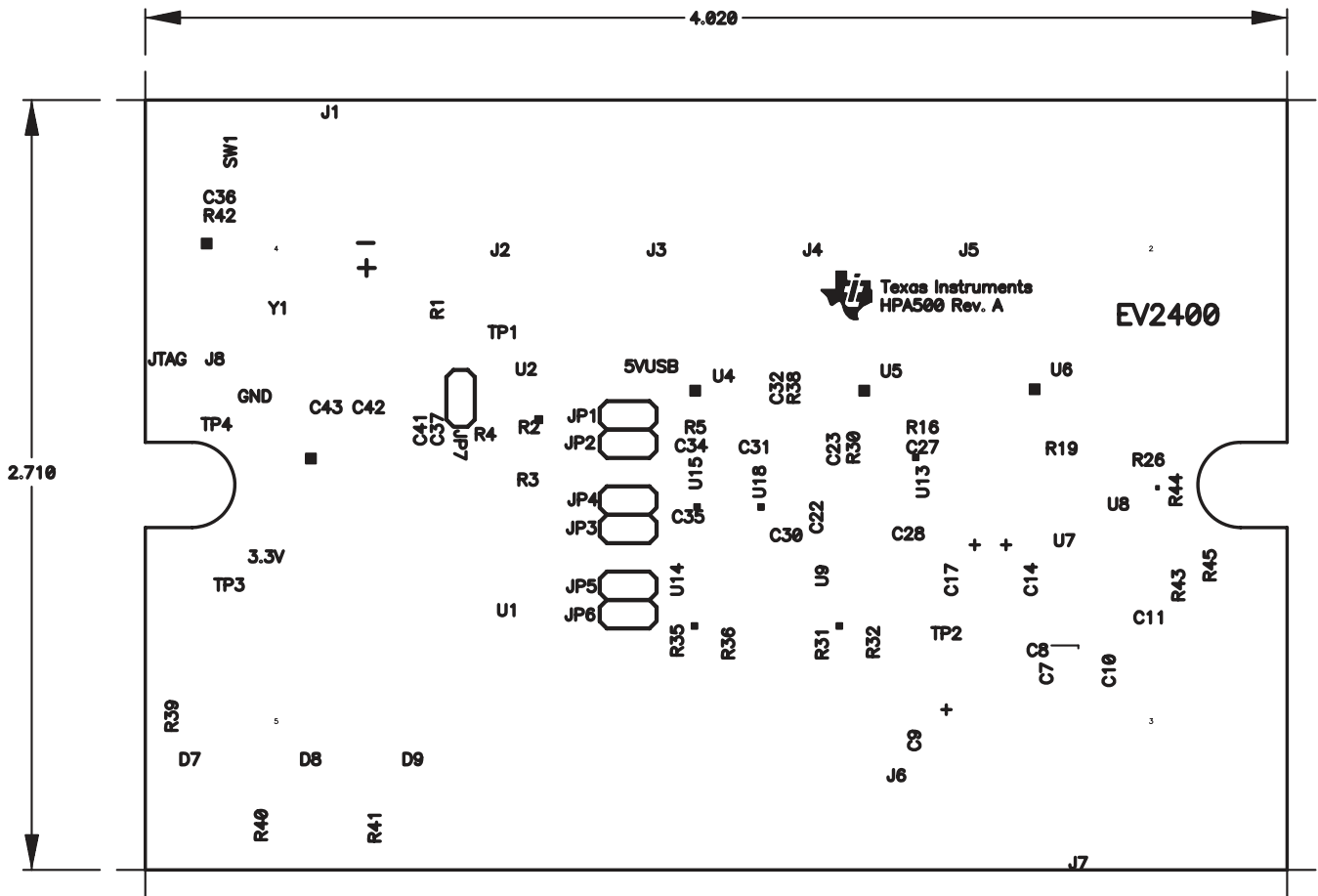**Figure 8. Solder Mask 1**

Figure 9. Solder Mask 2

Figure 10. Silkscreen

4.3 EV2400 Schematic
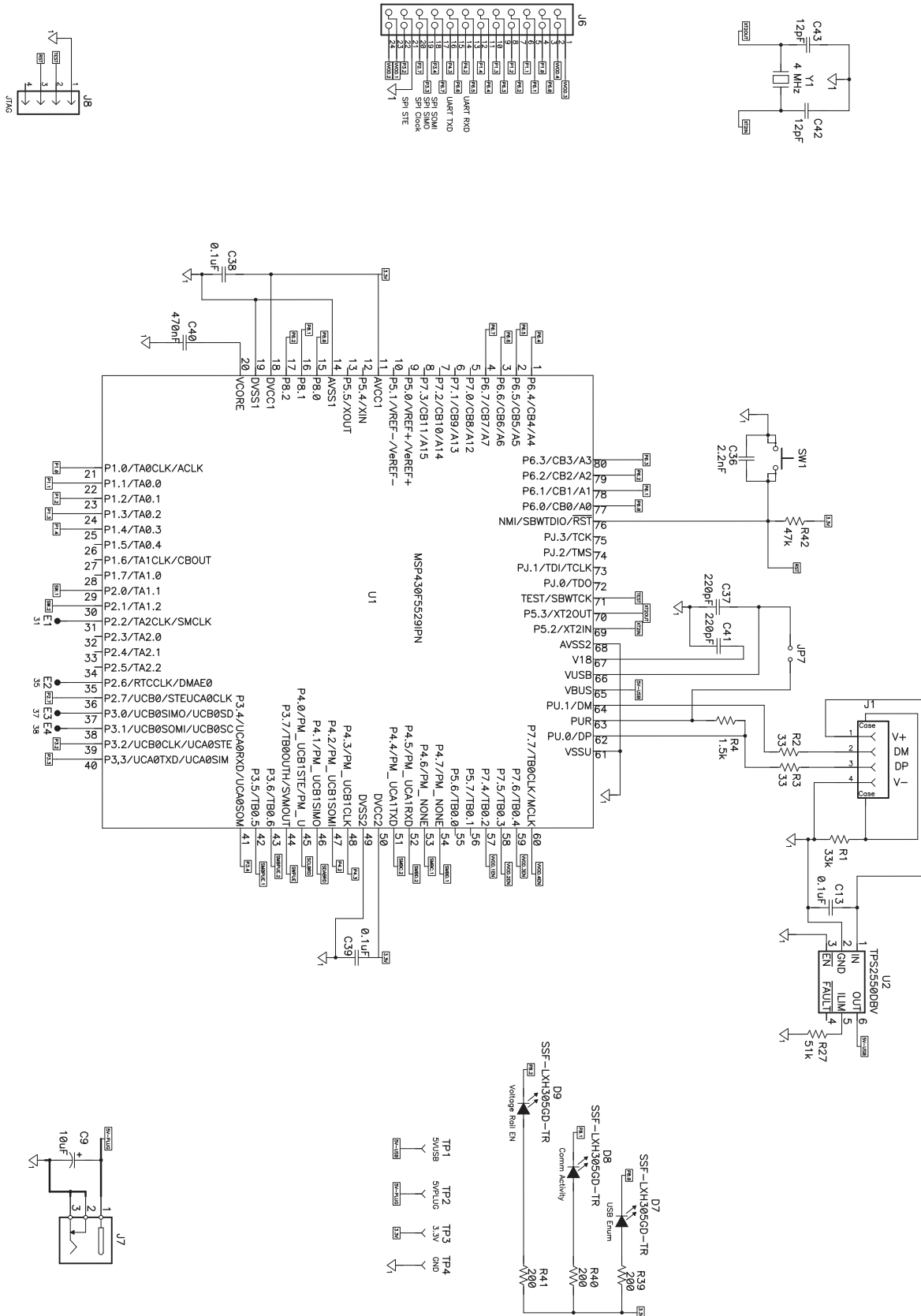
Figure 11. Schematic, Page 1
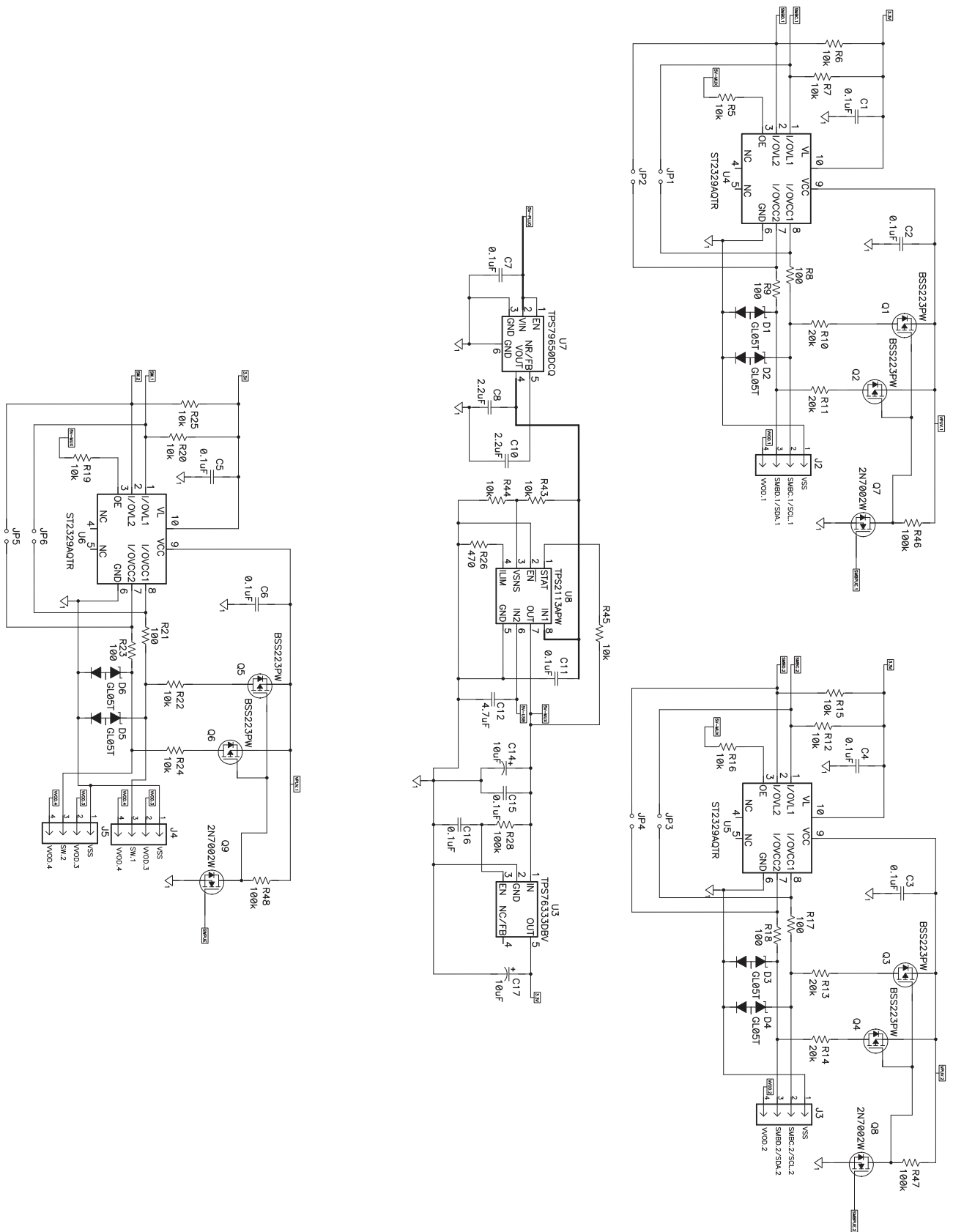
Figure 12. Schematic, Page 2
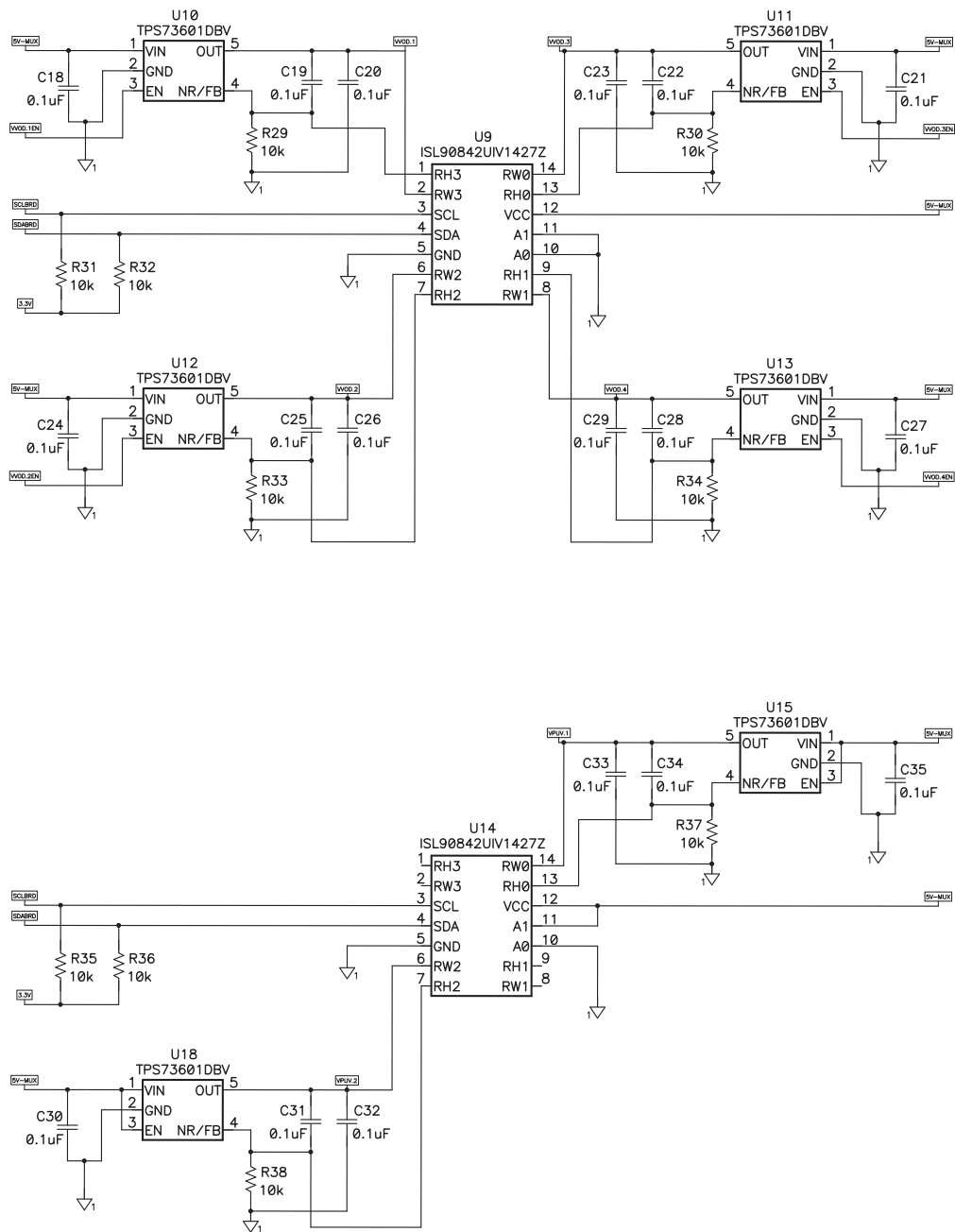
Figure 13. Schematic, Page 3

Revision History

Evaluation Board/Kit Important Notice

Texas Instruments (TI) provides the enclosed product(s) 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. Please read this user's guide and, specifically, the EVM Warnings and Restrictions notice below 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, contact a TI field representative or visit www.ti.com/esh.

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.

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.

Regulatory Information

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

This Class A 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. Cet appareil numérique de la classe A est confor á 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'user'; autorité de s pour actionner l'équipement.

EVM Warnings and Restrictions

It is important to operate this EVM within TI's recommended specifications and environmental considerations per the user guidelines. Failure to follow the guidelines may cause potential risk of personal injury, property damage, and/or unexpected operation of the EVM. If there are any questions, please contact a TI field representative before connecting and/or enabling power or other interface connections to the EVM.

During normal operation and within the EVM's recommended ratings, some circuit components including but not limited to linear regulators, switching transistors, pass transistors, current sense resistors, and heat sinks may have elevated case temperatures or contain voltages exceeding safe touch levels. These types of devices, as applicable, can be identified using the EVM schematic in this user's guide. When placing measurement probes near or on these devices during operation for evaluation purposes, precautions should be taken against inadvertent contact with surfaces of elevated temperatures and/or voltages exceeding safe touch levels.

As with all electronic evaluation tools, only qualified personnel knowledgeable in electronic measurement and diagnostics normally found in development environments should use these EVMs.

STANDARD TERMS FOR EVALUATION MODULES

1.   *Delivery:* TI delivers TI evaluation boards, kits, or modules, including any accompanying demonstration software, components, and/or documentation which may be provided together or separately (collectively, an "EVM" or "EVMs") to the User ("User") in accordance with the terms set forth herein. User's acceptance of the EVM is expressly subject to the following terms.

   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 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 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 a nonconforming EVM if (a) the nonconformity was 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, (b) the nonconformity resulted from User's design, specifications or instructions for such EVMs or improper system design, or (c) User has not paid on time. Testing and other quality control techniques are used to the extent TI deems necessary. TI does not test all parameters of each EVM. User's claims against TI under this Section 2 are void if User fails to notify TI of any apparent defects in the EVMs within ten (10) business days after delivery, or of any hidden defects with ten (10) business days after the defect has been detected.

   2.3   TI's sole liability shall be at its option to repair or replace EVMs that fail to conform to the warranty set forth above, 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.

WARNING

Evaluation Kits 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 shall operate the Evaluation Kit within TI's recommended guidelines and any applicable legal or environmental requirements as well as reasonable and customary safeguards. Failure to set up and/or operate the Evaluation Kit within TI's recommended guidelines may result in personal injury or death or property damage. Proper set up entails following TI's instructions for electrical ratings of interface circuits such as input, output and electrical loads.

NOTE:

EXPOSURE TO ELECTROSTATIC DISCHARGE (ESD) MAY CAUSE DEGREDATION OR FAILURE OF THE EVALUATION KIT; TI RECOMMENDS STORAGE OF THE EVALUATION KIT IN A PROTECTIVE ESD BAG.

3   *Regulatory Notices:*

    3.1   *United States*

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

FCC NOTICE: 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 or RSS-247*

Concerning EVMs Including Radio Transmitters:

This device complies with Industry Canada license-exempt RSSs. 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 to follow the instructions set forth by Radio Law of Japan, which includes, but is not limited to, the instructions below with respect to EVMs (which for the avoidance of doubt are stated strictly for convenience and should be verified by User):

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。

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

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

電力線搬送波通信についての開発キットをお使いになる際の注意事項については、次のところをご覧ください。http://www.tij.co.jp/lsds/ti_ja/general/eStore/notice_02.page

3.4 *European Union*

3.4.1 *For EVMs subject to EU Directive 2014/30/EU (Electromagnetic Compatibility Directive)*:

This is a class A product intended for use in environments other than domestic environments that are connected to a low-voltage power-supply network that supplies buildings used for domestic purposes. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

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:*

6.1 EXCEPT AS SET FORTH ABOVE, EVMS AND ANY MATERIALS PROVIDED WITH THE EVM (INCLUDING, BUT NOT LIMITED TO, REFERENCE DESIGNS AND THE DESIGN OF THE EVM ITSELF) ARE PROVIDED "AS IS" AND "WITH ALL FAULTS." TI DISCLAIMS ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, REGARDING SUCH ITEMS, INCLUDING BUT NOT LIMITED TO ANY EPIDEMIC FAILURE WARRANTY OR IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OR NON-INFRINGEMENT OF ANY THIRD PARTY PATENTS, COPYRIGHTS, TRADE SECRETS OR OTHER INTELLECTUAL PROPERTY RIGHTS.

6.2 EXCEPT FOR THE LIMITED RIGHT TO USE THE EVM SET FORTH HEREIN, NOTHING IN THESE TERMS SHALL BE CONSTRUED AS GRANTING OR CONFERRING ANY RIGHTS BY LICENSE, PATENT, OR ANY OTHER INDUSTRIAL OR INTELLECTUAL PROPERTY RIGHT OF TI, ITS SUPPLIERS/LICENSORS OR ANY OTHER THIRD PARTY, TO USE THE EVM IN ANY FINISHED END-USER OR READY-TO-USE FINAL PRODUCT, OR FOR ANY INVENTION, DISCOVERY OR IMPROVEMENT, REGARDLESS OF WHEN MADE, CONCEIVED OR ACQUIRED.

7. *USER'S INDEMNITY OBLIGATIONS AND REPRESENTATIONS.* USER WILL 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 HANDLING OR USE OF THE EVM THAT IS NOT IN ACCORDANCE WITH THESE TERMS. THIS OBLIGATION SHALL APPLY WHETHER CLAIMS ARISE UNDER STATUTE, REGULATION, OR THE LAW OF TORT, CONTRACT OR ANY OTHER LEGAL THEORY, AND EVEN IF THE EVM FAILS TO PERFORM AS DESCRIBED OR EXPECTED.

8. *Limitations on Damages and Liability:*

8.1 *General Limitations.* IN NO EVENT SHALL TI BE LIABLE FOR ANY SPECIAL, COLLATERAL, INDIRECT, PUNITIVE, INCIDENTAL, CONSEQUENTIAL, OR EXEMPLARY DAMAGES IN CONNECTION WITH OR ARISING OUT OF THESE TERMS OR THE USE OF THE EVMS , REGARDLESS OF WHETHER TI HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES. EXCLUDED DAMAGES INCLUDE, BUT ARE NOT LIMITED TO, COST OF REMOVAL OR REINSTALLATION, ANCILLARY COSTS TO THE PROCUREMENT OF SUBSTITUTE GOODS OR SERVICES, RETESTING, OUTSIDE COMPUTER TIME, LABOR COSTS, LOSS OF GOODWILL, LOSS OF PROFITS, LOSS OF SAVINGS, LOSS OF USE, LOSS OF DATA, OR BUSINESS INTERRUPTION. NO CLAIM, SUIT OR ACTION SHALL BE BROUGHT AGAINST TI MORE THAN TWELVE (12) MONTHS AFTER THE EVENT THAT GAVE RISE TO THE CAUSE OF ACTION HAS OCCURRED.

8.2 *Specific Limitations.* IN NO EVENT SHALL TI'S AGGREGATE LIABILITY FROM ANY USE OF AN EVM PROVIDED HEREUNDER, INCLUDING FROM ANY WARRANTY, INDEMITY OR OTHER OBLIGATION ARISING OUT OF OR IN CONNECTION WITH THESE TERMS, , EXCEED THE TOTAL AMOUNT PAID TO TI BY USER FOR THE PARTICULAR EVM(S) AT ISSUE DURING THE PRIOR TWELVE (12) MONTHS WITH RESPECT TO WHICH LOSSES OR DAMAGES ARE CLAIMED. THE EXISTENCE OF MORE THAN ONE CLAIM SHALL NOT ENLARGE OR EXTEND THIS LIMIT.

9. *Return Policy.* Except as otherwise provided, TI does not offer any refunds, returns, or exchanges. Furthermore, no return of EVM(s) will be accepted if the package has been opened and no return of the EVM(s) will be accepted if they are damaged or otherwise not in a resalable condition. If User feels it has been incorrectly charged for the EVM(s) it ordered or that delivery violates the applicable order, User should contact TI. All refunds will be made in full within thirty (30) working days from the return of the components(s), excluding any postage or packaging costs.

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.