

DRV8818EVM Evaluation Module

This document serves as a supplement to the DRV8818 data sheet. It details the hardware implementation of the DRV8818EVM evaluation module (EVM).

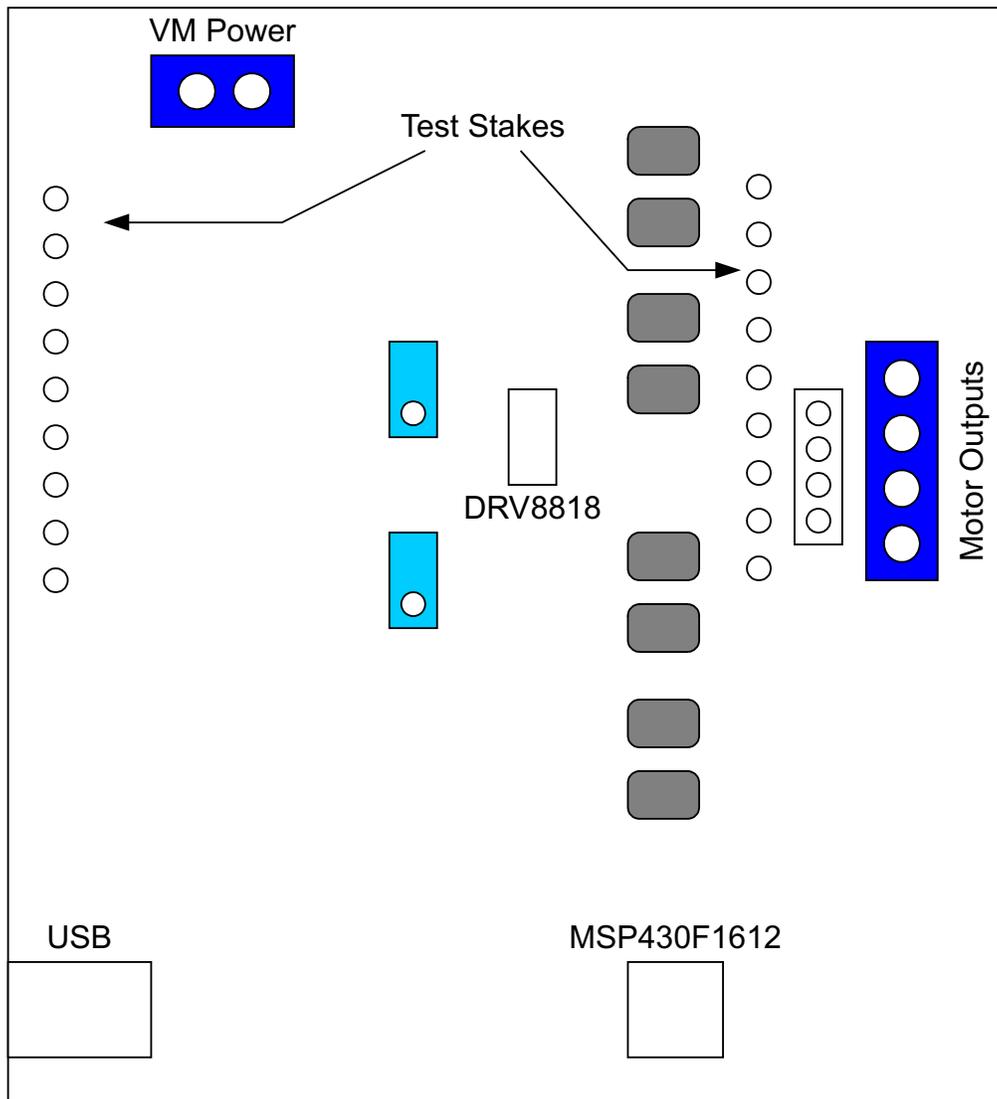
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1 Block Diagram



1.1 Introduction

The DRV8818EVM is a complete solution for evaluating the DRV8818 micro-stepping, bipolar stepper driver. It includes a USB link to provide easy control from a personal computer (PC), a MSP430 microcontroller that interprets serial commands from the PC and generates control signals to the driver device, and the DRV8818 device with access to all signals for a complete evaluation.

1.2 Power Connectors

The DRV8818EVM uses a combination of terminal blocks and test clips for the application and monitoring of power. The only power rail that the user must supply is VM for the device's power stage. VDD for logic levels is internally generated from the USB connection.

Users must apply VM (8 V to 35 V) according to data sheet recommended parameters.

1.3 Test Stakes

Every pin on the device has been brought out to a test stake. A label on the silkscreen identifies each signal.

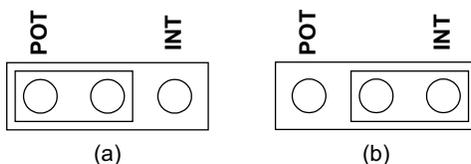
1.4 Jumpers

Two styles of jumpers are on the DRV8818EVM: two-pin jumpers and three-pin jumpers.

Users can configure three-pin jumpers independently from other two- or three-pin jumpers. However, two-pin jumpers must all be closed or left open.

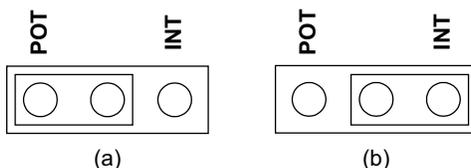
1.4.1 VREF SELECT, JP1

To configure the VREF SELECT jumper: (a) Select an analog voltage derived from VDD through a voltage divider implemented as a potentiometer R4. (b) Select an analog voltage derived from the MSP430's digital-to-analog converter (DAC) channel 0 (DAC0). Set as the following inset shows in (b) if you want to use the GUI to control the VREF voltage.



1.4.2 DECAY SELECT, JP6

To configure the DECAY SELECT jumper: (a) Select an analog voltage derived from VDD through a voltage divider implemented as a potentiometer R6. (b) Select an analog voltage derived from the MSP430's DAC channel 1 (DAC1). Set as the following inset shows in (b) if you want to use the GUI to control the DECAY modes.



1.5 Motor Outputs

Users can connect the bipolar stepper motor into the DRV8818EVM in three ways: four-pin header (J2), four-position terminal block (J3), or test clips. Each connection style offers identical connectivity to the device's output terminals. The recommended way, however, is to use the header or terminal block because the test stakes traces are of low-current handling capability.

2 Installing Drivers And Software

2.1 Installing FTDI USB Driver

Download the DRV8818EVM Software and Development package from the TI Web site in the [DRV8818EVM Evaluation Module](#) product folder. Find and unzip *Step 1 - INSTALL_USB_Driver* into a separate folder. See instructions on how to install the FTDI USB driver on a Windows™-based computer in the *FTDI_Drivers_Install_Readme.pdf* file.

2.2 Installing DRV8818EVM Windows Application Software

The available download also includes a file named *DRV8818EVM_Windows7_Application.zip*. Copy the contents of this folder to any desired folder on the computer. This causes the *Settings.ini* file to be written to the desired folder on software exit. This action cannot occur if the application is run within the zip file. Make sure to first unzip all the contents of the zip file into a folder on your computer.

2.3 Running Windows Application Software

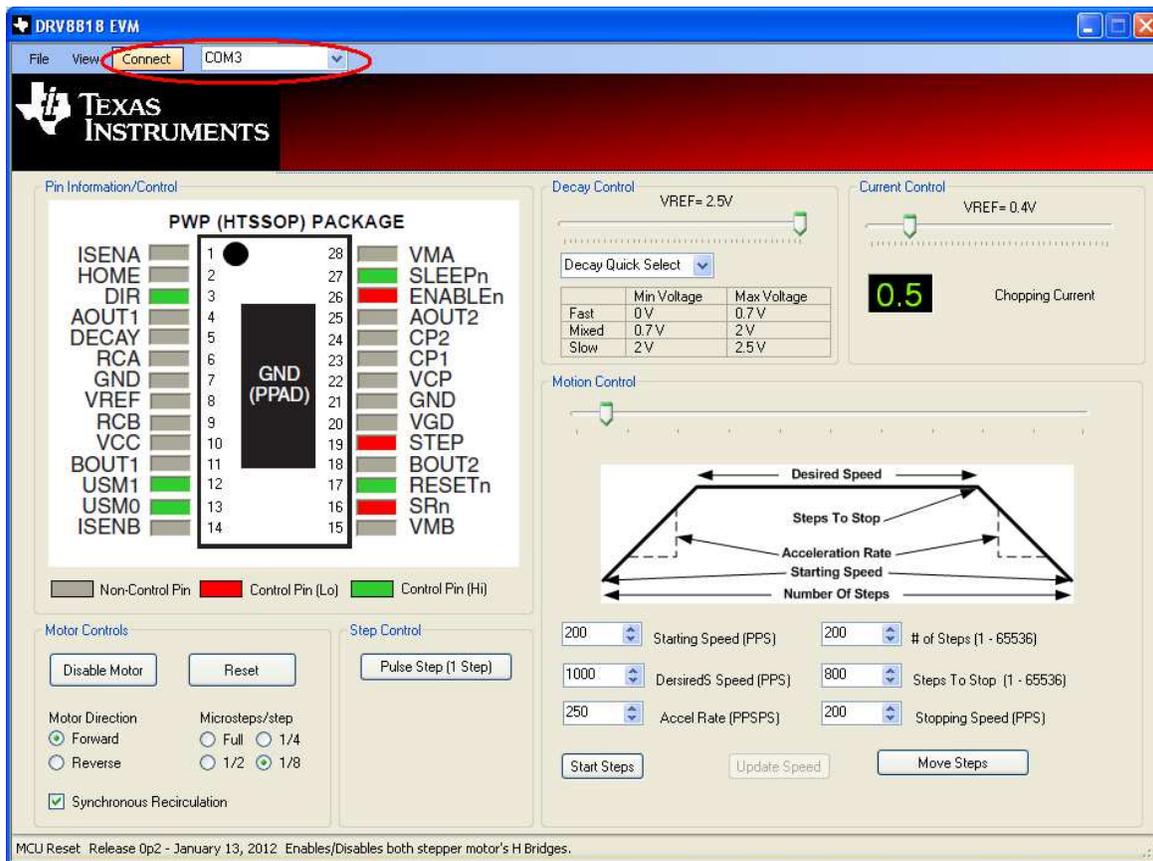
To run the application, double-click the DRV8818EVM.exe application icon found on the same folder into which the application was extracted. It is also available in the START menu under *Texas Instruments Inc.*

3 Windows Application

The DRV8818 Windows application is the software counterpart for the DRV8818EVM. This application is in charge of connecting to the MSP430 microcontroller by an USB connection, which in turn selects the proper logic state for the DRV8818 control signals.

The design of the graphical user interface (GUI) allows for all of the DRV8818 device's functionality to be tested without having to intervene with the hardware, except for the proper configuration of jumpers, when necessary.

The following illustration shows the DRV8818EVM.exe main screen. It contains menu items to configure and enable and disable the serial port, frames with GPIO control for the DRV8818 Control Signals, Stepper Motor control for start and stop and speed, and current and decay control through the MSP430 DACs.



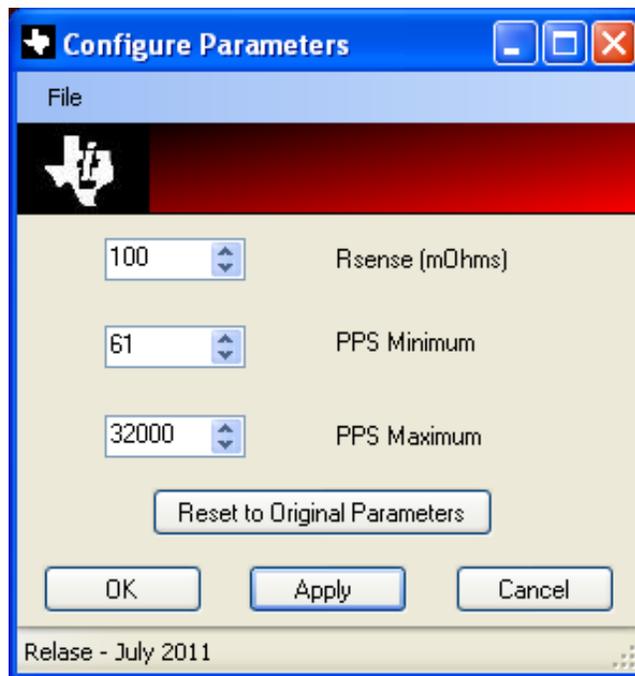
3.1 Connecting the EVM

The GUI auto-detects the port to which the USB has connected on connection of the USB cable between the EVM and an available port on your PC. This is displayed in the window. Click the *Connect* button. If this does not work, possible sources of error are as follows:

- FTDI drivers were not installed properly and the FTDI-USB chip is not recognized. Check for connection in *Control Panel*→*System*→*Hardware*→*Device Manager*→*Ports* for a valid connection.
- Close the GUI, and reopen it to properly identify the open port.

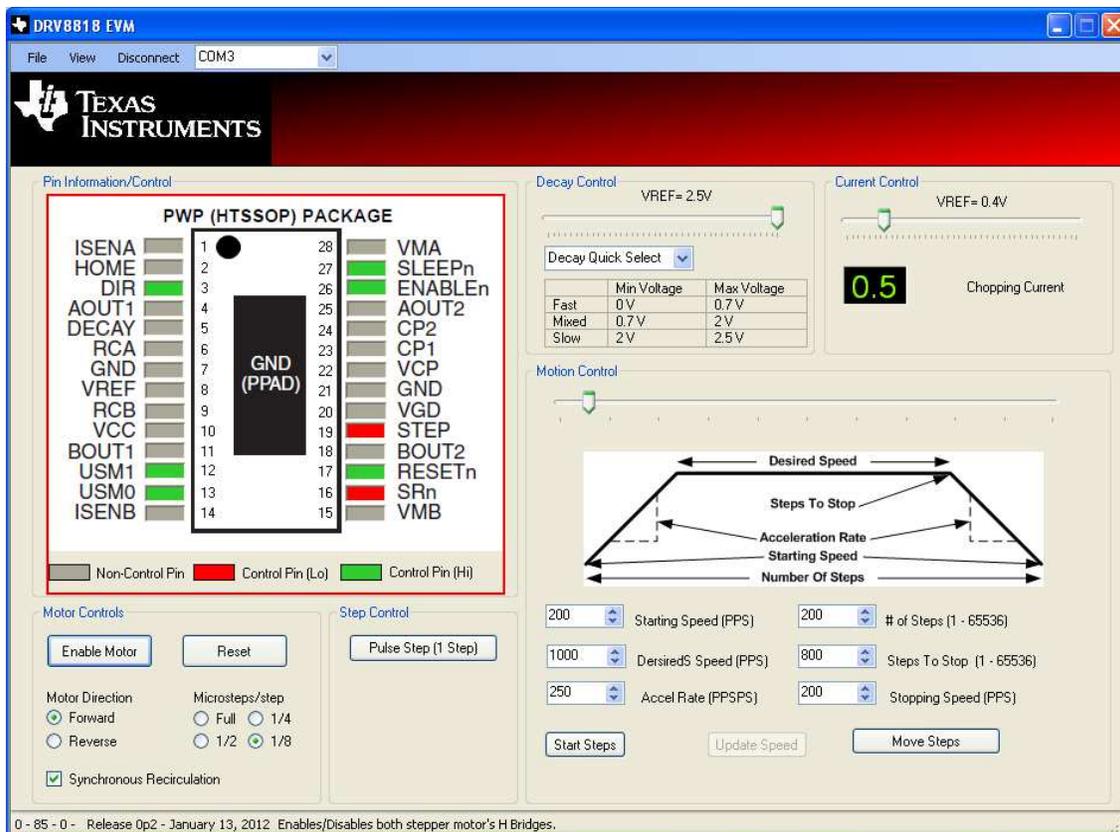
3.2 Initial Configuration

First, go into the File menu. Select File→Configure Parameters, and the following box displays:



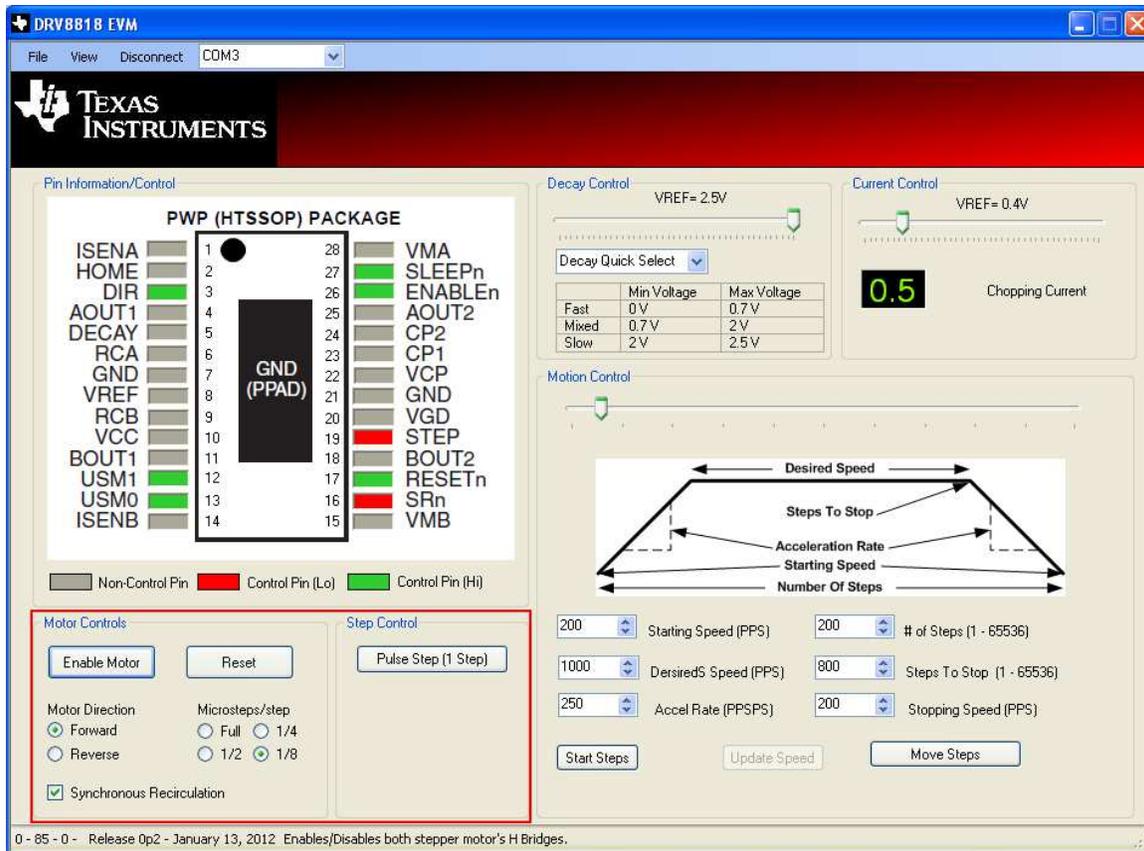
Rsense shows the default of 100. If any modifications are made to the EVM, be sure to change these fields so that current is properly regulated.

3.3 Operating the GUI



3.3.1 Pin Information Control

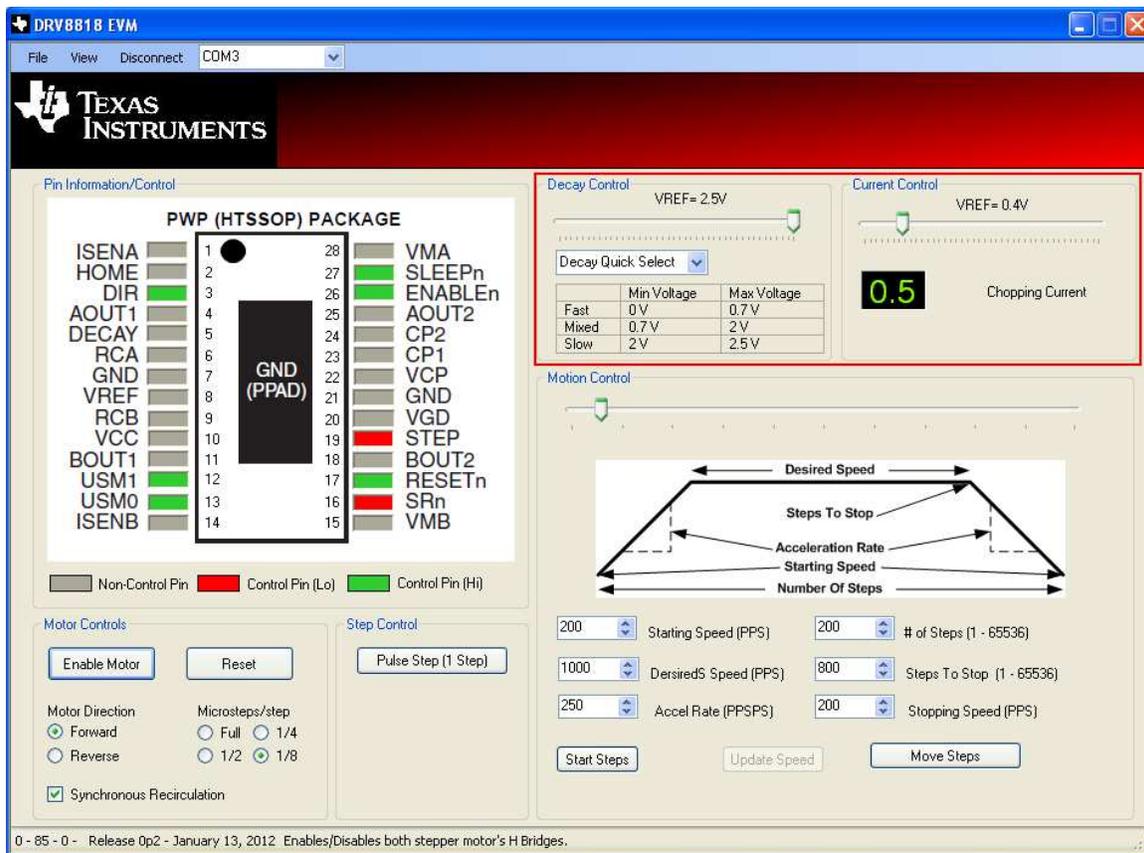
Control pins appear in **RED** or **GREEN**. Click on these pins to change the state of the pin; this shows the current state. Using the following key, you can see that a **RED** color indicates that the pin is a logic low, and a **GREEN** color indicates it is logic high.



3.3.2 Basic Configuration and Control Buttons

Whereas clicking the individual pins changes the state of the pins, you can also use the control boxes at the bottom to change the state of the pins.

For example, click on the *Full Step* radio button in the bottom right corner of the highlighted box. What happens to the picture on the top?

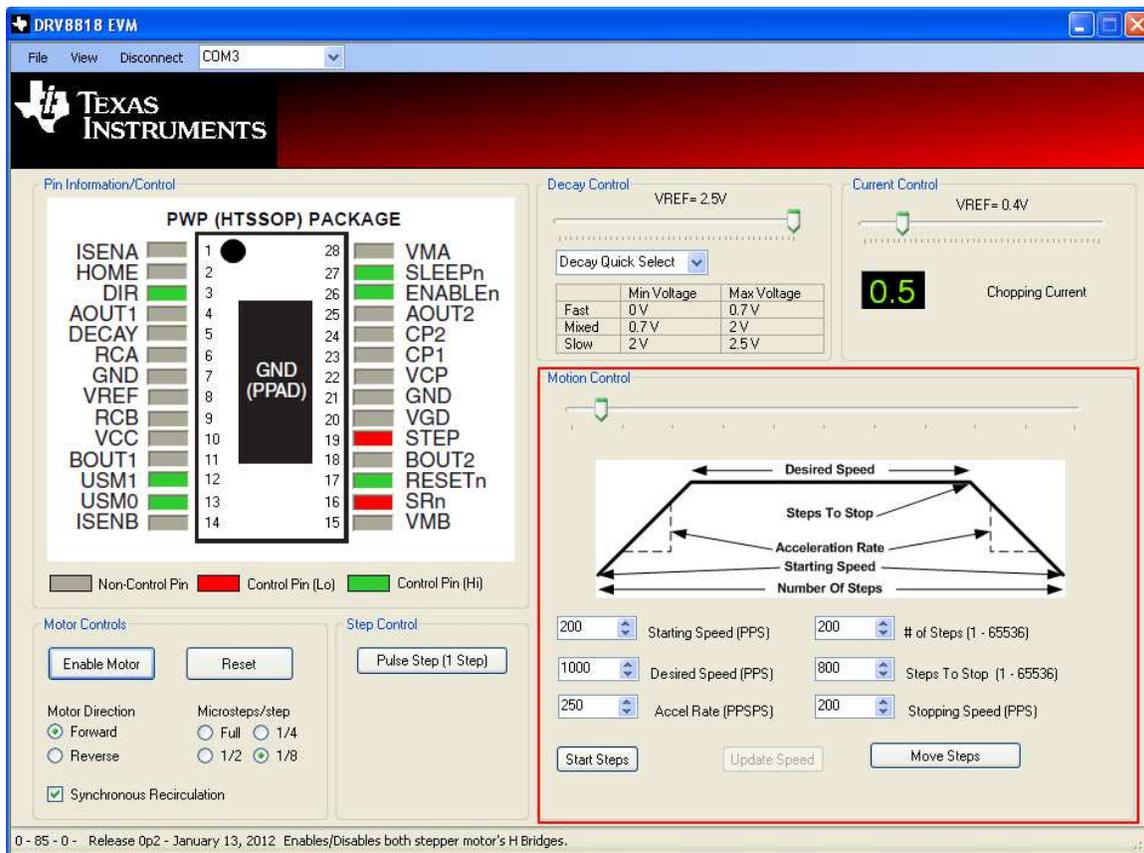


3.3.3 Current Control and Decay Modes

This set of boxes controls the reference current and the current decay modes once this current threshold is reached.

- Decay Control:** The slider allows you to control the voltage on the DECAY pin. This controls which mode the device is in when the current is decreasing through the load on the falling edge of the sinusoidal current. In FULL Step mode, this control does not apply. The table shows the modes as it corresponds to the voltage applied on the DECAY pin. For example, a voltage less than 0.7 V fixes the device in a Fast decay mode. A voltage greater than 2 V puts the device in a Slow decay mode. A voltage between 0.7 V and 2 V selects a mixed decay with a ratio of fast decay followed by slow decay depending on the voltage set between 0.7 V and 2 V. This is easier to see on an oscilloscope capture.
- Current Control:** This slider sets the voltage on VREF. The current displays on the screen based on the following calculation:

$$I_{ref} = V_{ref} / 8 \times R_{sense}$$



3.3.4 Motion Control

Constant Speed Mode:

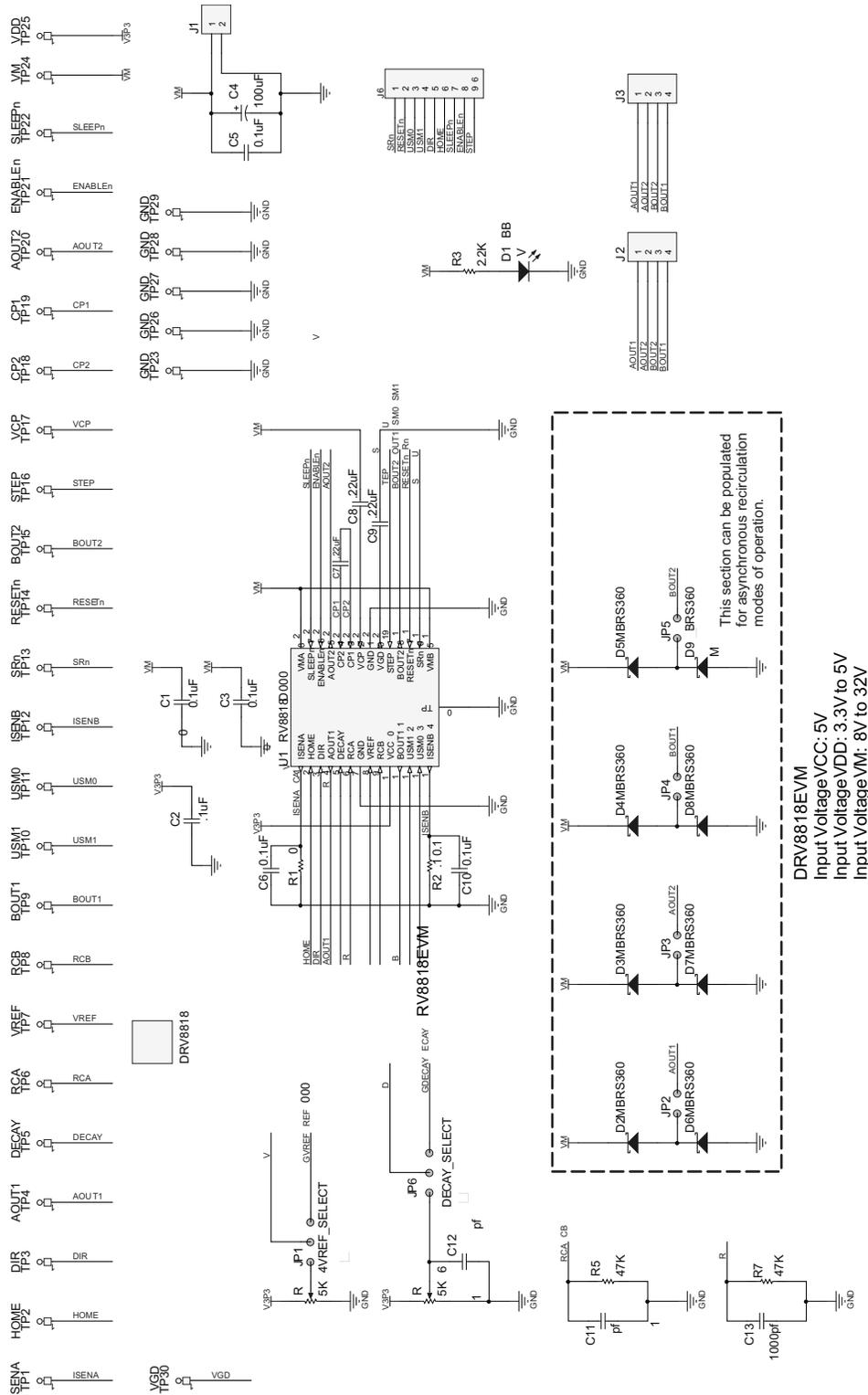
- **Starting Speed (PPS):** The following discussion defines pulses-per-second or PPS. A pulse is a single step in the logic table. This is not necessarily a mechanical step. If you change micro-stepping modes, you must double this for the same speed (in 1/2 step), x4 for 1/4 step, and so on.
- **Desired Speed (PPS):** This is the final speed that the motor ramps to and holds, otherwise known as the target speed.
- **Acceleration Rate (PPSPS):** This is how fast the device ramps from the starting speed to the desired speed. This is also the deceleration rate once you pause stepping.
- **Start Steps Button:** Press this button to spin. Press it again to stop, or pause, spinning.
- **Update Speed Button:** While spinning, you can change the *Desired Speed* field and nothing will happen until you click *Update Speed*.

Indexing Mode:

- **# of Steps:** In Full Step mode, this is the number of mechanical steps you want to take. For example, if the motor on your bench has 200 steps in a revolution and you want to move one revolution, you choose 200 steps. If you are in 1/2 step mode, you need to double this to 400 for a full revolution.
- **Steps To Stop:** When the number of steps taken achieves this point, the motor starts to decelerate at the rate given in the *Acceleration Rate* field.
- **Stopping Speed:** After the steps in the *Steps To Stop* field is reached and the motor begins to decelerate, the motor rotates at this speed (once it is reached) until the value in the *# of Steps* is reached.
- **Move Steps Button:** Click this to begin indexing. Once indexing is complete, you can click it again to repeat the cycle.

4 Schematic and Bill of Materials

4.1 Schematics



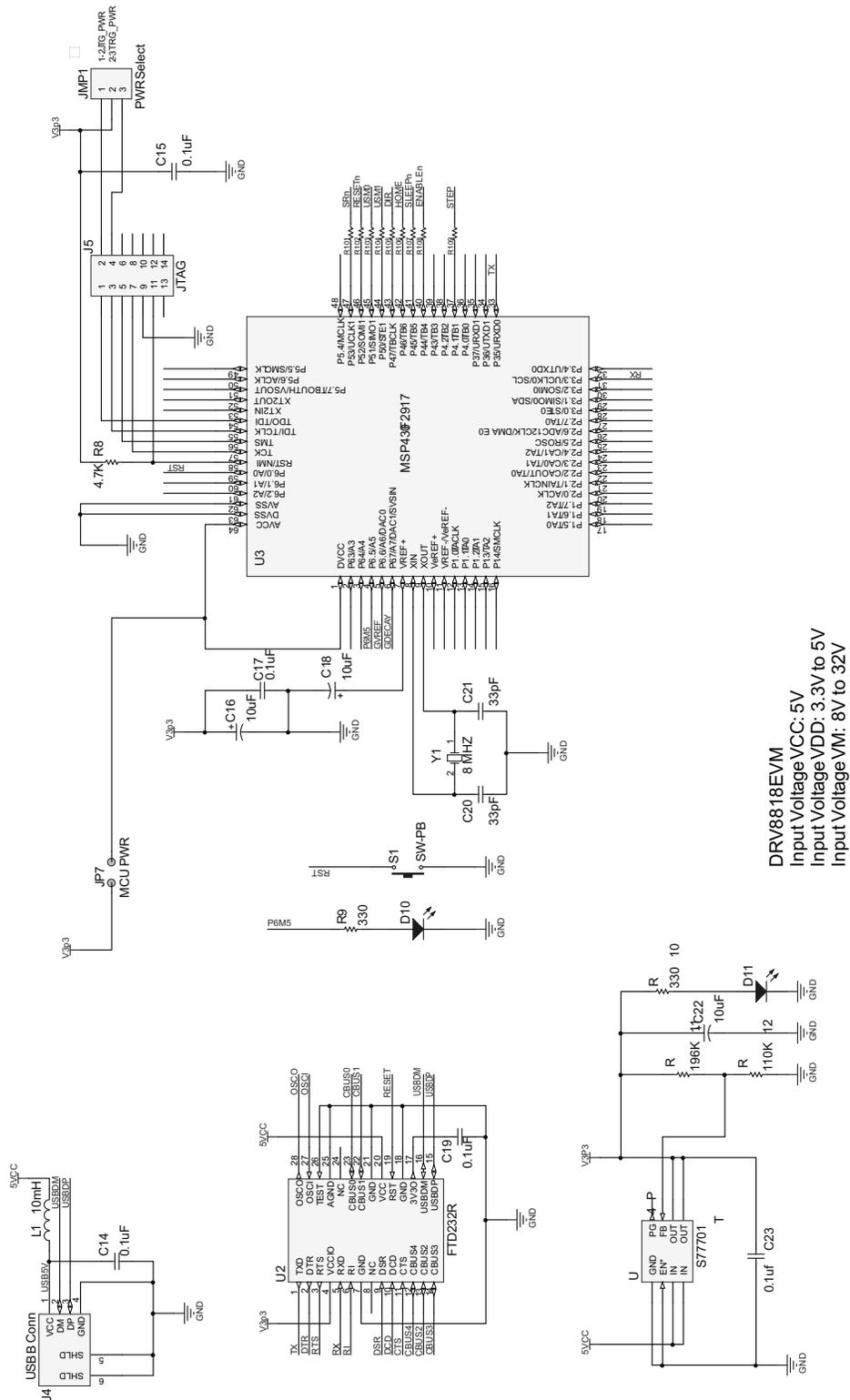


Figure 2. Schematic 2 of 2

4.2 Bill of Materials

QTY	Designator	Value	Description	Manufacturer	MFG Part Number
11	C1, C2, C3, C5, C6, C10, C14, C15, C17, C19, C23	0.1uF	Capacitor	Kemet	C0805C104K5RACTU
1	C4	100uF	100uF, 50V Electrolytic Cap	Panasonic	ECA-1HM101
3	C7, C8, C9	.22uF	Capacitor	Kemet	C0805C224K5RACTU
3	C11, C12, C13	1000 pf	Capacitor	Kemet	C0805C102K5RACTU
3	C16, C18, C22	10uF	10uF, 25V Electrolytic Cap (Radial)	Nichicon	UVR1E100MDD
2	C20, C21	33pF	Capacitor	Yageo	CC0805JRNPO9BN330
3	D1, D10, D11	LED RED	LED RED Clear 1206 SMD	Stanley Electric & Co	HBR1105W-TR
DNI	D2, D3, D4, D5, D6, D7, D8, D9	MBR360	3A, 60V, Schottky Diode	On Semiconductor	MBRS360T3G
1	J1	2 Pos	Terminal Block, 2 Pos, 200 mil pitch	On Shore Technology Inc.	OSTTA024163
1	J2	4 Pos Header	Single Line, 4 Pos, 100 mil pitch Header Connector	Sullins	PBC04SAAN
1	J3	4 Pos	Terminal Block, 4 Pos, 200 mil pitch	On Shore Technology Inc.	OSTTA044163
1	J4	USB B	USB B Style Connector	Molex	67068-8000
1	J5	14 Pos Header	Header, 7-Pin, Dual row, Right Angle	Sullins	PBC07DAAN
1	J6	9 Pos Header	Control	Sullins Connector Solutions	PBC09SAAN
1	JMP1	3 Pos Header	Single Line, 3 Pos, 100 mil pitch Header Connector	Sullins	PBC03SAAN
2	JP1, JP6	3 Pos Header	Single Line, 3 Pos, 100 mil pitch Header Connector	Sullins	PBC03SAAN
DNI	JP2, JP3, JP4, JP5	2 Pos Header	Single Line, 2 Pos, 100 mil pitch Header Connector	Sullins	PBC02SAAN
1	JP14	0.230" (5.84mm)	Two Pin Jumper	Sullins Connector Solutions	PBC02SAAN
1	L1	10mH	Ferrite Bead 1.5A 40 ohm 0805 SMD	Steward	MI0805K400R-10
1	PCB1	N/A	CPG001 PCB Bare Board	N/A	N/A
2	R1, R2	0.1	Resistor	Bourns	CRA2512-FZ-R100ELF
1	R3	2.2K	Resistor	Yageo	RC0805JR-072K2L
2	R4, R6	5K	Potentiometer	Murata Electronics	PV37Y502C01B00
2	R5, R7	47K	Resistor	Yageo	RC0805JR-0747KL
1	R8	4.7K	Resistor	Yageo	RC0805JR-074K7L
2	R9, R10	330	Resistor	Yageo	RC0805JR-07330RL
1	R11	196K	Resistor	Yageo	9C08052A1963FKHFT
1	R12	110K	Resistor	Yageo	RC0805JR-07110KL
9	R101, R102, R103, R104, R105, R106, R107, R108, R109	3300	Resistor	Yageo	RC0603FR-073K3L
1	S1	Push Button	Switch	Panasonic	EVQ-11A04M

Schematic and Bill of Materials
www.ti.com

QTY	Designator	Value	Description	Manufacturer	MFG Part Number
23	TP1, TP2, TP3, TP4, TP5, TP6, TP7, TP8, TP9, TP10, TP11, TP12, TP13, TP14, TP15, TP16, TP17, TP18, TP19, TP20, TP21, TP22, TP30	Test Stake White	Glass Beaded Test Point	Kobiconn	151-101-RC
5	TP23, TP26, TP27, TP28, TP29	Test Stake Black	Glass Beaded Test Point	Kobiconn	151-103-RC
2	TP24, TP25	Test Stake Red	Glass Beaded Test Point	Kobiconn	151-107-RC
1	U1	Driver	Bipolar Stepper Motor Driver With Indexer	Texas Instruments	DRV8818PWP
1	U2	USB Driver	USB Chip	FTDI	604-00043
1	U3	MSP430 MCU	MSP430 Microcontroller	Texas Instruments	MSP430F2617TPMR
1	U4	LDO	750 mA LDO 8-SOIC	Texas Instruments	TPS77701D
1	Y1	Crystal	Crystal Oscillator	ECS Inc.	ECS-80-20-4

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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.

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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.

REGULATORY COMPLIANCE INFORMATION (continued)

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.

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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.

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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.

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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 are 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.

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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.

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TI has specifically designated certain components which meet ISO/TS16949 requirements, mainly for automotive use. Components which have not been so designated are neither designed nor intended for automotive use; and TI will not be responsible for any failure of such components to meet such requirements.

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