DRV11873 Evaluation Module

This document is provided with the DRV11873 customer evaluation module (EVM) as a supplement to the DRV11873 datasheet (SLWS237). It details the hardware implementation of the EVM.

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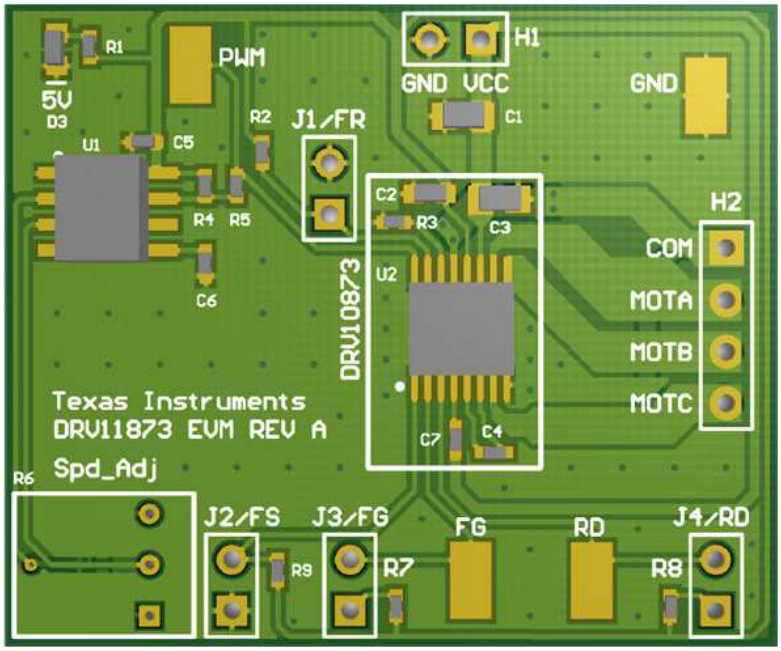
1 PCB (Top 3D View)



2 Introduction

The DRV11873EVM is a complete solution for evaluating the DRV11873 12-V, three-phase, sensorless BLDC motor driver. It includes a TLC555 timer configured to supply a PWM to the DRV11873, a potentiometer to adjust the speed of the motor by varying the duty cycle of the PWM, a jumper on the FG pin to allow the use of an external pull-up resistor, and a jumper on the FS pin to set ½ or normal frequency output on the FG pin. The DRV11873EVM also has a jumper on the FR pin to select forward or reverse and a jumper on the FS pin to vary for high- or low-speed motor applications. Power can be provided externally, up to 16 V, through the power header. The PWM, RD, FG, and GND signals are all brought out to surface mounted test points.

The DRV11873EVM is configured so that connections to only the motor and power supply are required.

2.1 Power Connectors

The DRV11873EVM uses a combination of headers for the application and monitoring of power. For the EVM, only a single power-supply rail is necessary. Minimum recommended Vin for the EVM is 5 V and maximum is 16 V. Please see the datasheet for the DRV11873 for complete voltage range information of the driver itself. When power is supplied to the board a green LED (D3) in the bottom-right corner should enable.

The overcurrent threshold setup pin sets the current limit for the device and is connected to a 3.3-kΩ resistor (R3) on the DRV11873EVM. This sets the current limit at 2 A for the DRV11873. This resistor can be replaced and a new current limit set using Equation 1. Please see the datasheet for the DRV11873 for more information on the overcurrent threshold setup pin.

$$I_{LIMIT}\ (mA) = 6600 / R_{CS}\ (\Omega) \text{ for } 500\ mA < I_{LIMIT} < 2000\ mA \quad (1)$$

VCC for the DRV11873 is directly taken off the H1 power supply header. The H1 header is located on the top side of the EVM near the top of the board as shown in Figure 1.

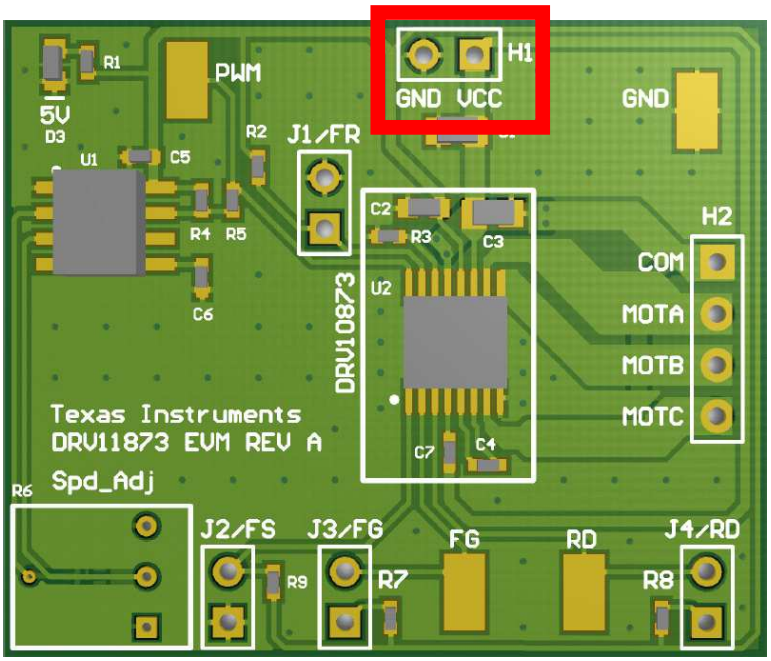


Figure 1. Top View (H1 Power Supply Header)

2.2 Test Points

Test points are provided and labeled according to the inputs and outputs of the DRV11873 motor driver. The signals brought out to test points are labeled *FG*, *RS*, *PWM*, and *GND*.

The signal *PWM* is generated by circuitry on the EVM. In order to provide your own PWM signal to the motor driver, remove the 0.0-Ω resistor (R5) and connect your own PWM signal to the *PWM* test point. The *PWM* signal generated by the circuitry on the EVM is approximately 25 kHz and can be adjusted from 5% to 95% duty cycle by the potentiometer (R6) located on the EVM.

The FG signal's frequency represents the motor speed and phase information.

$$RPM = (FG \times 60) / \text{pole pairs} \quad (2)$$

Please refer to the datasheet of the DRV11873 for more information regarding the FG pin.

The RD pin is an open drain output which is tied to VCC through a pull-up resistor. In this case, the pull-up resistor value (R8) is 100 kΩ. During the lock protection condition, RD output remains high until the lock protection is dismissed and restart completed. A current limit function has been built in for the RD pin which prevents the open drain MOSFET from damage in case VCC or V5 directly connects to the RD pin. Please refer to the datasheet of the DRV11873 for more information regarding the RD pin.

2.3 Jumpers

There are four jumpers (J1 – J4) on the EVM that are normally installed.

Jumper J1 connects the FR pin of the DRV11873. When installed, the pin is set low for forward rotation. When removed, the pin is pulled high and the motor will spin in reverse.

Jumper J2 connects the FS pin of the DRV11873 to adjust for different speed selections for various applications. When installed, the FS pin is set to pull low. When J2 is open, the FS pin pulls high.

Jumper J3 connects the FG pin of the DRV11873 to a pull-up resistor if you wish to provide the FG signal externally.

Jumper J4 is used to connect the RD pin of the DRV11873 through a pull-up resistor to V5. When removed, the pin will float.

For normal operation right out of the box, all jumpers should be installed.

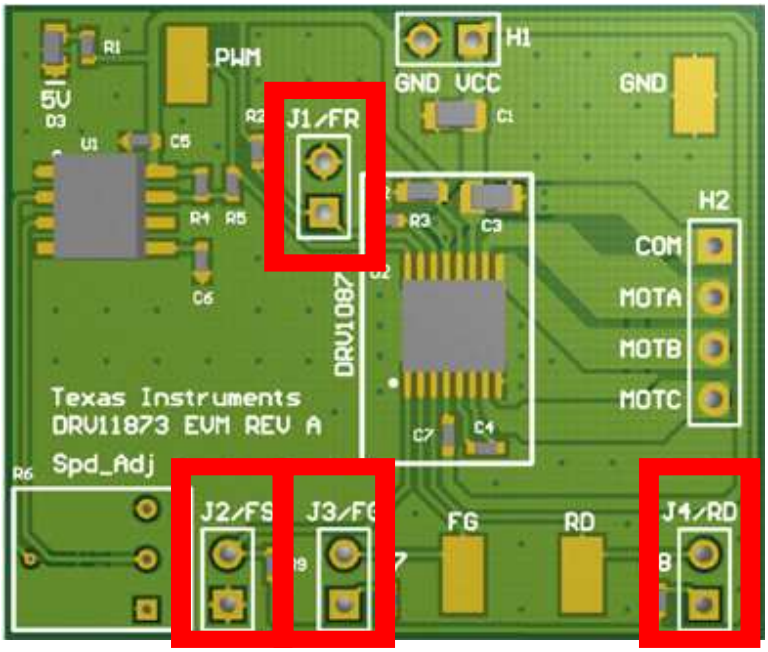


Figure 2. Jumper Settings

2.3.1 FR Forward and Reverse (J1) Jumper

J1 can be found in Figure 2. Installing the jumper connects the FR pin on the DRV11873 to GND. When the FR pin is tied to GND, the motor is set to spin in forward rotation. When removed, the pin is pulled high and the motor will spin in reverse. **FR is latched upon power to the EVM so power must be cycled in order for the motor direction to change.**

2.3.2 FS Frequency Select (J2) Jumper

J2 can be found in Figure 2. Installing the jumper connects the FS pin on the DRV11873 to GND. When the FS pin is tied to GND, the DRV11873 is set for optimized startup for low fan speed motors with high motor winding resistance and high inductance. With the jumper out, the FS pin pulls up to VCC through a pull-up resistor. When the FS pin is tied to VCC, the DRV11873 is optimized for startup for high speed fan motors with low motor winding resistance and high inductance. **FS is latched upon power to the EVM so power must be cycled in order for the FS output to change.**

2.3.3 FS Frequency Generator (J3) Jumper

J3 can be found in Figure 2. Installing the jumper will connect the FG pin of the DRV11873 to an on board pull-up resistor. If you wish to make an external connection to FG, the jumper can be removed and the FG test point provides a direct connection to the FG pin of the DRV11873. The FG test point is highlighted in Figure 3. Please note that if the jumper is removed, an external pull-up resistor is needed for connection of FG to an external system. For more information regarding the FG pin please refer to the DRV11873 datasheet (SLWS237).

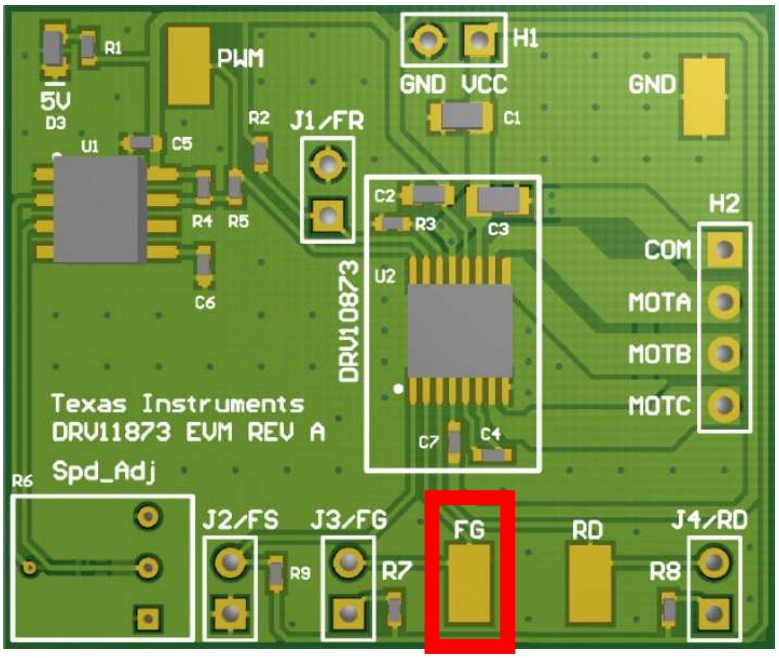


Figure 3. FG Test Point

2.3.4 RD Rotation Detection (J4) Jumper

The RD pin is an open-drain output which is tied to V5 through a pull-up resistor when J4 is in place. In this case, the pull-up resistor value (R8) is 100 kΩ. During the lock protection condition, RD output remains high until the lock protection is dismissed and restart completed. With J4 removed, the pin will float when the lock protection condition occurs. The jumper allows for external pull-up resistors to be used to change the value of RD when lock detection takes place. Please refer to the datasheet of the DRV11873 for more information regarding the RD pin.

2.4 Speed Adjust Potentiometer (R6)

The speed-adjust potentiometer *Spd_Adj* can be found in Figure 4. The potentiometer adjusts the duty cycle of the PWM signal which, will in turn, adjust the speed of the motor. In order to lower the duty cycle, and in turn, lower the speed, turn the potentiometer counter-clockwise. In order to increase the duty cycle, and in turn, increase the speed, turn the potentiometer clockwise.

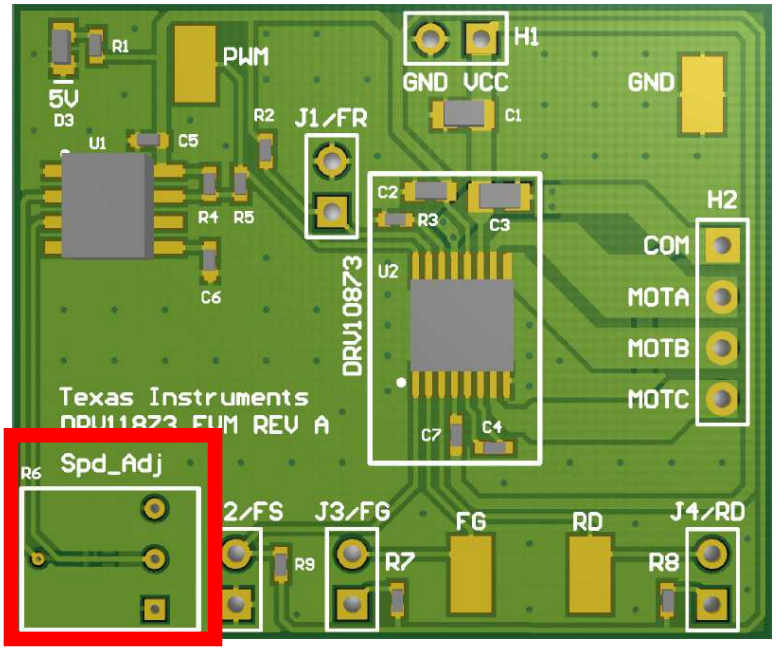


Figure 4. DRV11873 Speed-Adjust Potentiometer

The onboard PWM signal for the DRV11873 is generated by a circuit based upon TI's TLC555 Low Power Timer. It is capable of an approximately 25-kHz output that can be adjusted from 5% to 95% duty cycle. This square output signal will switch from 0 V to VCC.

In order to provide an external PWM signal to the DRV11873, first remove the 0.0-Ω resistor, R5. Next, connect the external PWM signal to the *PWM* surface mounted test point. For more information on the PWM input required by the DRV11873 please refer to the datasheet.

2.5 Motor Outputs

Connect a three-phase 12-V BLDC motor to pins A, B, C, and COM of the header H2. Polarity is not critical for A, B, and C. The motor outputs are located on H2 as shown in Figure 5.

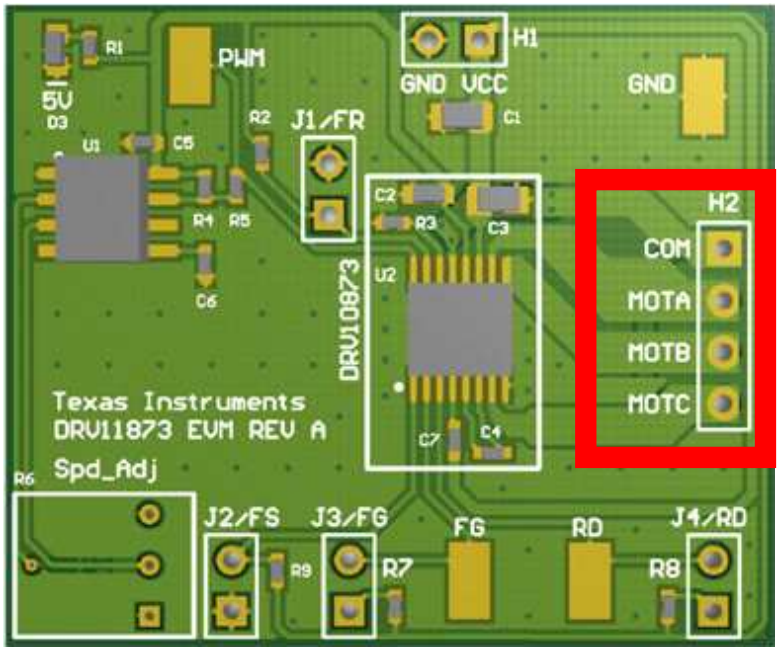


Figure 5. DRV11873 Motor Outputs

2.6 Operation of the EVM

1. Connect a 12-V, three-phase BLDC motor to pins A, B, C, and COM of **H2**.
2. Adjust the *Spd_Adj* potentiometer (**R6**) to minimum voltage by turning it all the way counter-clockwise. This will minimize the motor speed.
3. Apply power to the H1 header.
4. Adjust the *Spd_Adj* potentiometer clockwise towards the motor outputs to increase speed and the motor will start to turn. Continue adjusting as desired.
5. To change direction, disconnect power and remove J4.

3 Schematic

Figure 6 is the DRV11873 schematic.

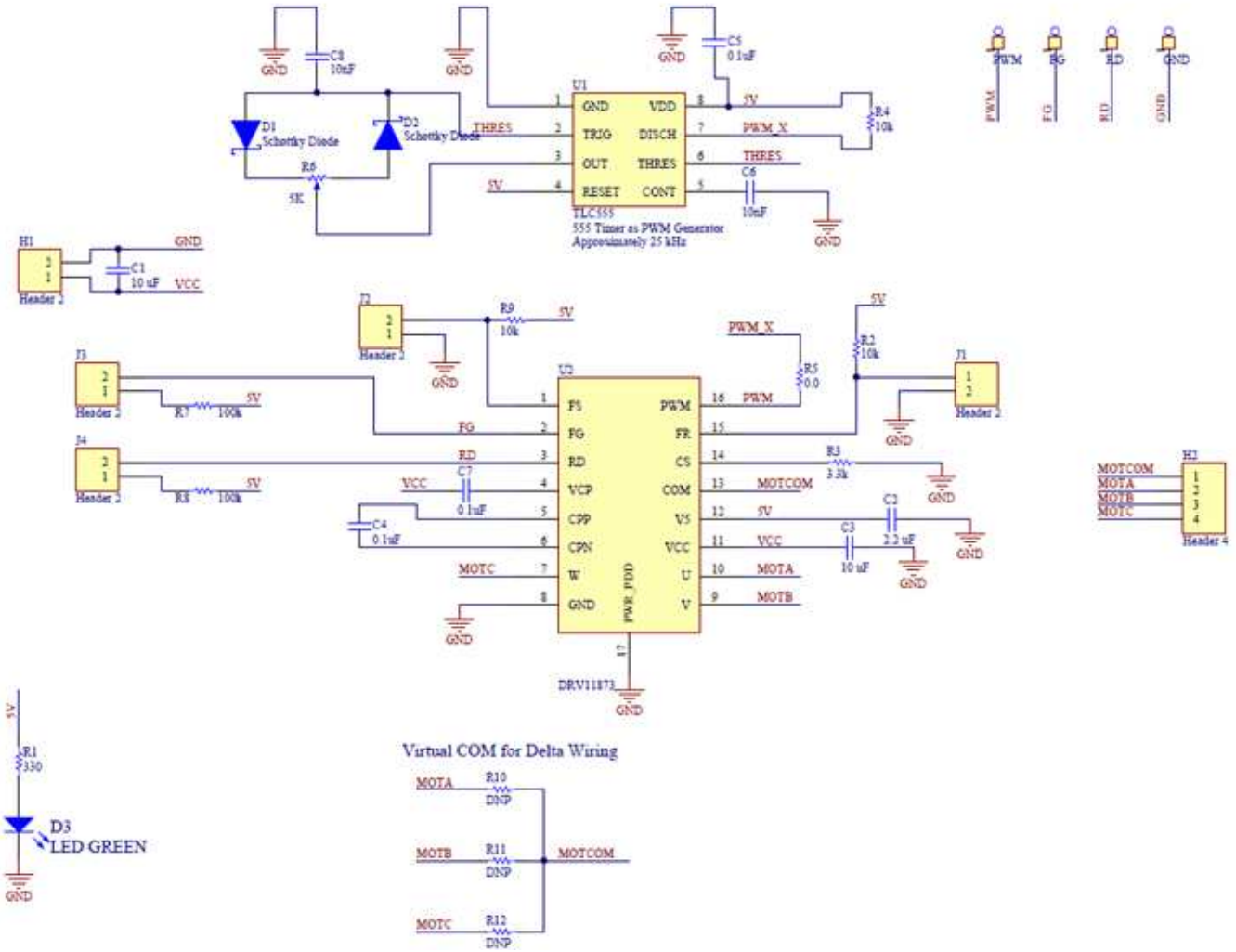


Figure 6. DRV11873 Schematic

4 Bill of Materials

Table 1 is the bill of materials for the EVM.

Table 1. DRV11873 Bill of Materials

Description	Designator	DigiKey Part #	Manufacturer	MFG Part Number	Qty
CAP CER 10UF 25V 10% X5R 0805	C1, C3	490-5523-1-ND	Murata Electronics North America	GRM21BR61E106KA73L	2
CAP CER 2.2UF 25V 10% X5R 0603	C2	587-2909-1-ND	Taiyo Yuden	TMK107ABJ225KA-T	1
CAP CER 0.1UF 25V Y5V 0402	C4, C5, C7	445-3445-1-ND	TDK Corporation	C1005Y5V1E104Z	3
CAP CER 10000PF 25V 10% X7R 0402	C6, C8	445-1260-1-ND	TDK Corporation	C1005X7R1E103K	2
DIODE SCHOTTKY 1A 40V MICROSMP	D1, D2	MSS1P4-M3/89AGICT-ND	Vishay General Semiconductor	MSS1P4-M3/89A	2
LED 1.6X0.8MM 570NM GRN CLR SMD	D3	754-1116-1-ND	Stanley Electric & Co	HBR1105W-TR	1
PC TEST POINT MINIATURE SMT	FG, GND, PWM, RD	534-5019 (Mouser)	Keystone Electronics	5019	4
Header, 2-Pin	H1, J1, J2, J3, J4	3M9447-ND	3M	961102-6404-AR	5
Header, 4-Pin	H2	3M9449-ND	3M	961104-6404-AR	1
RES 330 OHM 1/10W 5% 0402 SMD	R1	P330JCT-ND	Panasonic - ECG	ERJ-2GEJ331X	1
RES 10K OHM 1/10W 5% 0402 SMD	R2, R4, R9	P10KJCT-ND	Panasonic - ECG	ERJ-2GEJ103X	3
RES 3.3K OHM 1/10W 5% 0402 SMD	R3	P3.3KJCT-ND	Panasonic Electronic Components	ERJ-2GEJ332X	1
RES 0.0 OHM 1/16W 0402 SMD	R5	311-0.0JRCT-ND	Yageo	RC0402JR-070RL	1
POT 5.0K OHM THUMBWHEEL CERM ST	R6	3352T-502LF-ND	Bourns Inc.	3352T-1-502LF	1
RES 100K OHM 1/10W 5% 0402 SMD	R7, R8	P100KJCT-ND	Panasonic - ECG	ERJ-2GEJ104X	2
RES 1DNP 5% 0603 SMD	R10, R11, R12	DNP	DNP	DNP	3
IC OSC MONO TIMING 2.1MHZ 8-SOIC	U1	296-10341-1-ND	Texas Instruments	TLC555QDR	1
12-V, 3-PHASE, SENSORLESS BLDC MOTOR DRIVER	U2	Supplied	Texas Instruments	DRV11873	1

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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.

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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.

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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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西新宿三井ビル
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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.

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

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TI has specifically designated certain components as meeting ISO/TS16949 requirements, mainly for automotive use. In any case of use of non-designated products, TI will not be responsible for any failure to meet ISO/TS16949.

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