DRV8833C Evaluation Module

This document is provided with the DRV8833C customer evaluation module (EVM) as a supplement to the DRV8833C datasheet (SLVSCP9). The user's guide details the hardware implementation of the EVM. Throughout this user's guide, the abbreviation *EVM* and the term *evaluation module* are synonymous with the DRV8833CEVM, unless noted otherwise.

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1 PCB View

Figure 1 and Figure 2 illustrate the 3-D view of the DRV8833C EVM. The size of the EVM is 76.2 mm × 50.8 mm.

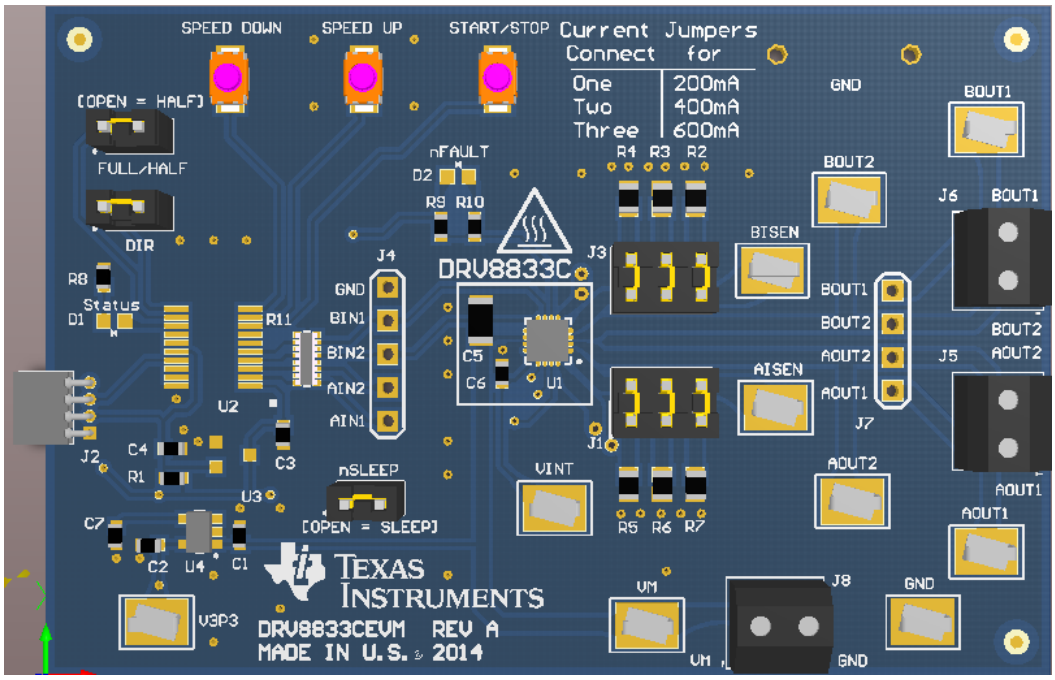

Figure 1. Top 3-D View

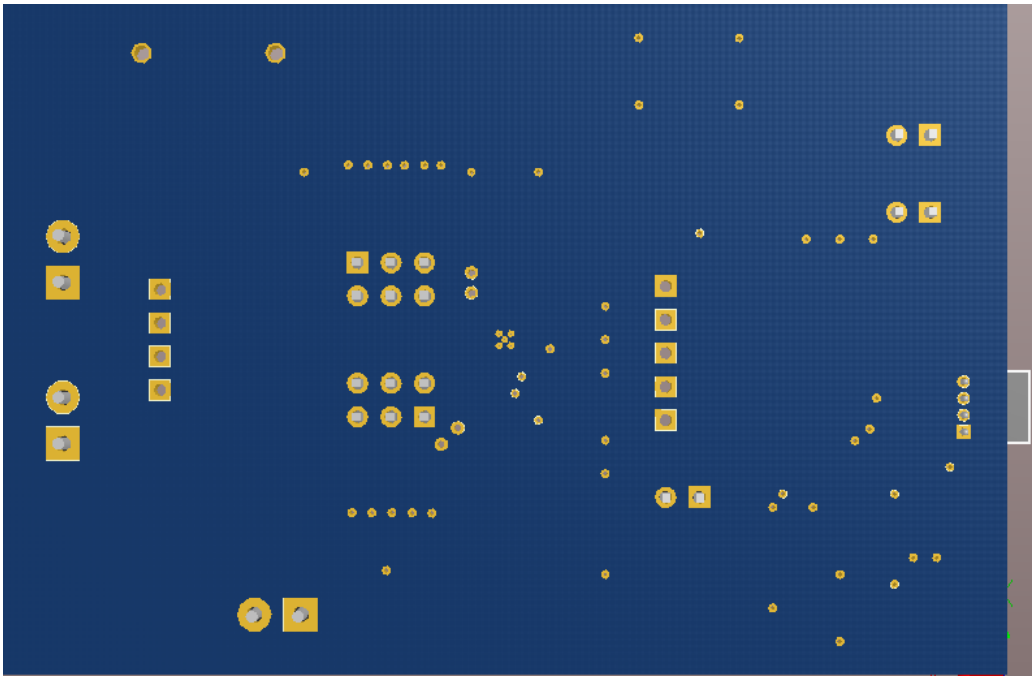

Figure 2. Bottom 3-D View

2 Introduction to the EVM

The DRV8833CEVM is a complete solution for evaluating the DRV8833C stepper controller. It includes an MSP430G2553 MCU and the firmware necessary to control the DRV8833C. Power is provided externally, up to 10.8 V.

The Spy-Bi-Wire interface (J2) is provided to allow evaluation of user code.

The motor can be controlled by three press buttons and five jumpers on the boards. The following list provides the functions of DRV8833C EVM:

- START/STOP, SPEED UP, SPEED DOWN buttons
- DIRection control for motor jumper
- FULL/HALF step configuration jumper
- nSLEEP configuration jumper
- Chopping current configuration jumpers

2.1 Connectors

For the EVM, a single power supply is necessary. An LDO linear regulator has been placed on the EVM to power the MCU. Maximum recommended VM for the EVM should be 10.8 V. See the DRV8833C datasheet (SLVSCP9) for the complete voltage range information of the DRV8833C. When the power supply is connected to the board, a green STATUS LED (D1) on the left of the board begins blinking.

Power for the DRV8833CEVM is available through connector J8, located on the bottom right of the EVM as shown in Figure 3.

The motor connections are provided through connectors J5 and J6 on the right of the EVM.

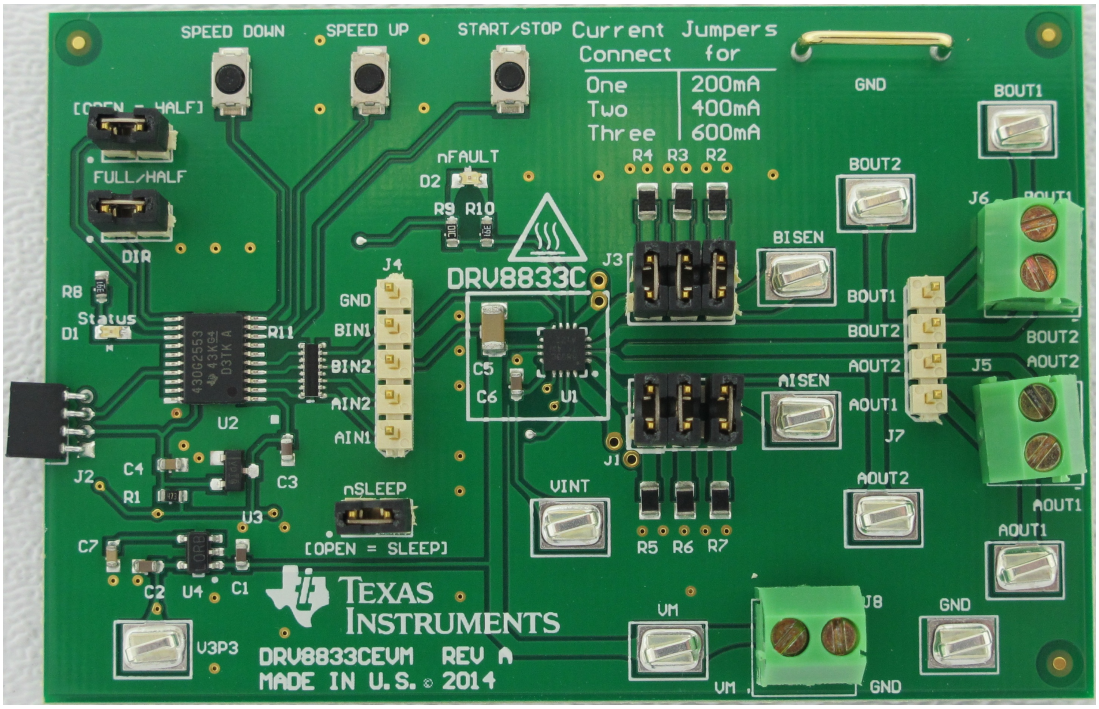

Figure 3. Connectors

2.2 Test Points

Test points are provided and labeled according to the inputs and outputs of the DRV8833C motor driver. J4 is also provided as test points. If external control of the DRV8833C is desired, remove R11 to isolate the MCU from the DRV8833C.

2.3 Jumpers and Buttons

Designator	Picture	Description
J1, J3		Sets the value of sensing resistor which determines the chopping current for the motor Connect 1 jumper vertically on J1 and J3 for 200 mA Connect 2 jumpers vertically on J1 and J3 for 400 mA Connect 3 jumpers vertically on J1 and J3 for 600 mA The picture to the left shows 3 jumpers connected on J1 and J3
START/STOP		Press to start/stop the motor
SPEED UP		Press and hold to increase the speed of the motor
SPEED DOWN		Press and hold to decrease the speed of the motor
DIR		Change direction of the motor
FULL/HALF		Open for half micro-step, close for full step
nSLEEP		Open for sleep mode, close to enable

START/STOP: Push the button to start or stop the motor. Starts the motor with the starting speed (100 pps at full micro-step, 200 pps at half micro-step). Stops the motor from current speed to zero with internal fixed deceleration rate (200 pps at full micro-step, 400 pps at half micro-step). If the speed of the stepper is less than stopping speed, the MCU will cut off the pulse-width modulation (PWM) input and stop the stepper immediately.

SPEED UP: Push and hold to speed up the motor with internal fixed linear acceleration rate (200 pps at full micro-step, 400 pps at half micro-step). Limited to the MAX speed by software (1000 pps at full micro-step, 2000 pps at half micro-step).

SPEED DOWN: Push and hold for speed down the motor with internal fixed linear deceleration rate (the same as acceleration rate). Limited to the MIN speed by software (100 pps at full micro-step, 200 pps at half micro-step).

DIR: Change the direction of the stepper, can be changed as the motor is spinning, but may cause the motor to stall.

FULL/HALF: Change stepping mode, can be changed as the motor is spinning, but may cause the motor to stall. Also updates the MIN/MAX and accelerating/decelerating rate.

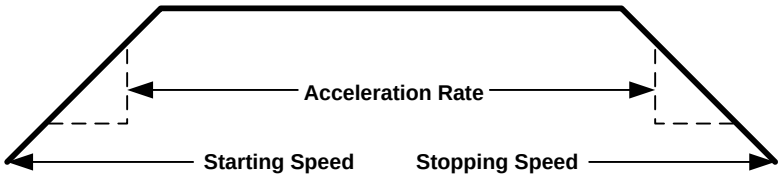

Figure 4. Speed Curve of the DRV8833C

2.4 Operating the EVM

The DRV8833CEVM operates without the need of a GUI. After the power supply and motor is connected to the board, the motor will spin up by pressing the START/STOP button. The speed of the motor can be increased by pressing the SPEED UP button and can be decreased by pressing the SPEED DOWN button. The direction will be changed by removing or connecting the shunt on the DIR jumper. Leaving the FULL/HALF jumper open, puts the motor into half-step mode. Keeping the FULL/HALF closed places the motor full-step mode. Remove the shunt on nSLEEP jumper to put the DRV8833C in sleep mode. The chopping current of the EVM can be modified by adding or removing the shunts on J1 and J3 which will change the value of the sense resistor.

3 Schematic

The schematic (Figure 5) in this document may be less resolution ratio. Refer to the separately provided schematic file in the EVM reference package.

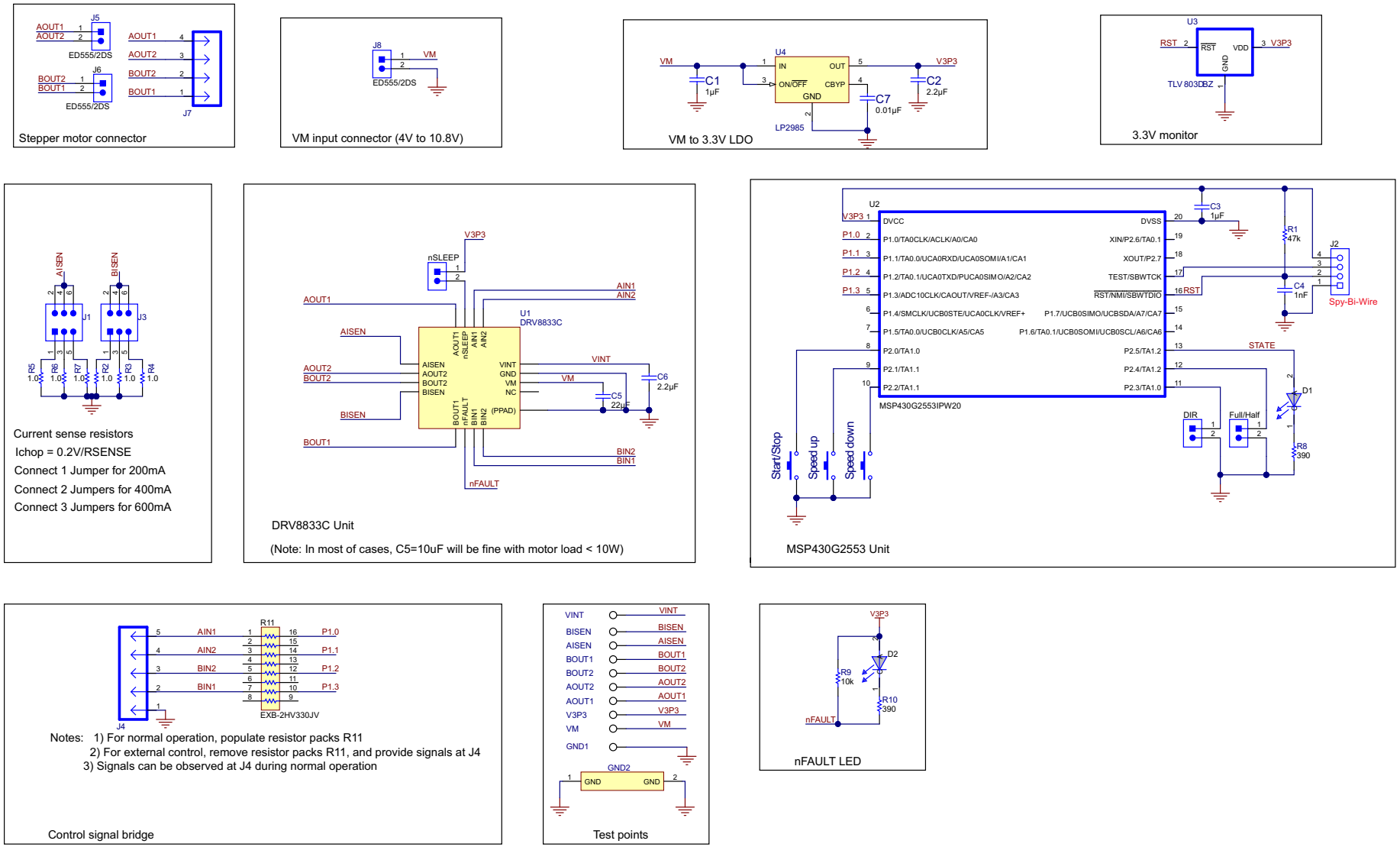

Figure 5. EVM Schematic

4 EVM Bill of Materials (BOM)

Table 1 lists the BOM for this EVM.

Table 1. Bill of Materials

Designator	Description	Manufacturer	Part Number	Quantity
!PCB	Printed Circuit Board	Any	DRV8833CEVM	1
AISEN, AOUT1, AOUT2, BISEN, BOUT1, BOUT2, GND1, V3P3, VINT, VM	Test Point, Compact, SMT	Keystone	5016	10
C1, C3	CAP, CERM, 1uF, 16V, +/-10%, X5R, 0603	Kemet	C0603C105K4PACTU	2
C2, C6	CAP, CERM, 2.2uF, 10V, +/-10%, X5R, 0603	Kemet	C0603C225K8PACTU	2
C4	CAP, CERM, 1000pF, 50V, +/-5%, X7R, 0603	Kemet	C0603C102J5RACTU	1
C5	CAP, CERM, 22uF, 16V, +/-10%, X5R, 1206	MuRata	GRM31CR61C226KE15L	1
C7	CAP, CERM, 0.01 µF, 50 V, +/- 10%, X7R, 0603	MuRata	GRM188R71H103KA01D	1
D1	Diode, LED, Green, 2.1-V, 20-mA, 6-mcd	Lite On	LTST-C190GKT	1
D2	Diode, LED, Red, 2.1-V, 20-mA, 6-mcd	Lite On	LTST-C190CKT	1
DIR, Full/Half, nSLEEP	Header, 100mil, 2x1, Tin plated, TH	Molex	90120-0122	3
FID1, FID2, FID3	Fiducial mark. There is nothing to buy or mount.	N/A	N/A	3
GND2	1MM UNINSULATED SHORTING PL	Harwin	D3082-05	1
J1, J3	Header, 100mil, 3x2, Tin, TH	Sullins Connector Solutions	PEC03DAAN	2
J2	SOCKET .050" GRID SIP 4 POS R/A, TH	Mill-Max	851-43-004-20-001000	1
J4	Header, Male 5-pin, 100mil spacing,	Sullins	PEC05SAAN	1
J5, J6, J8	Terminal Block, 6A, 3.5mm Pitch, 2-Pos, TH	On-Shore Technology	ED555/2DS	3
J7	Header, Male 4-pin, 100mil spacing,	Sullins	PEC04SAAN	1
R1	RES, 47k ohm, 5%, 0.1W, 0603	Vishay-Dale	CRCW060347K0JNEA	1
R2, R3, R4, R5, R6, R7	RES, 1.0 ohm, 5%, 0.125W, 0805	Vishay-Dale	CRCW08051R00JNEA	6
R8	RES, 390 ohm, 1%, 0.1W, 0603	Yageo America	RC0603FR-07390RL	1
R9	RES, 10k ohm, 5%, 0.1W, 0603	Vishay-Dale	CRCW060310K0JNEA	1
R10	RES, 390 ohm, 5%, 0.1W, 0603	Vishay-Dale	CRCW0603390RJNEA	1
R11	RES, 33 ohm, 5%, 0.0625W, Resistor Array - 8x1	Panasonic	EXB-2HV330JV	1
SH-DIR, SH-Full/Half, SH-J1_1, SH-J1_2, SH-J1_3, SH-J3_1, SH-J3_2, SH-J3_3, SH-nSLEEP	Shunt, 100mil, Gold plated, Black	3M	969102-0000-DA	9
Speed down, Speed up, Start/Stop	Tactile Switches 3.9x2.9x2.0mm 160gf	ALPS	SKRKAEE010	3
U1	DRV8833C 0.7A Stepper Driver	Texas Instruments	DRV8833CRGT	1
U2	IC, Mixed Signal Microcontroller	TI	MSP430G2553IPW20	1
U3	IC, Voltage Supervisors with Active-Low, Open-Drain Reset	TI	TLV803SDBZ	1
U4	Micropower 150 mA Low-Noise Ultra Low-Dropout Regulator, 5-pin SOT-23, Pb-Free	Texas Instruments	LP2985IM5-3.3/NOPB	1

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      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.

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      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.

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- *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*

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

Concernant les EVMs avec appareils radio:

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

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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

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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.

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