TPS25910EVM-088 EVM: Evaluation Module for the TPS25910

This User's Guide describes the TPS25910EVM-088 evaluation module (EVM) for the TPS25910. The TPS25910 is a 3-V through 20-V, high-current load switch with programmable inrush slew rate.

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1 Introduction

The TPS25910EVM allows reference circuit evaluation of the TI TPS25910 high-current load switch.

1.1 Features

- 3-V to 20-V operation
- Power limit controlled inrush current
- Fast circuit breaker control
- Hardware programmable inrush slew rate
- Provisions for external blocking MOSFET control
- A slide switch controls the $\overline{\text{ENABLE}}$ signal
- Copper pour with vias to the internal ground takes advantage of the power pad package
- On-board transorb is for over-voltage input protection
- Common diode at output prevents negative spike when load is removed while powered on

1.2 Applications

- Server
  - Plug-In Circuit Boards
  - RAID/disk drive
- Telecom
  - ATCA
  - Micro-ATCA
- General Hot Plug

2 Description

This EVM enables full evaluation of the TPS25910 device. Refer to the schematic shown in Figure 1. Ethernet power is applied at J1/J2 while J3/J4 provide the output connection to the load. D1, C6 and C1 provide input protection for the TPS25910 (U1). S1 allows U1 to be enabled or disabled with R3/R5 providing a means for an external turn-on threshold. Circuit faults can be observed at TP6.

Turn on or inrush slew rate control can be enabled by installing a shunt on J5 which connects C5 to GATE. For blocking applications, Q1 can be installed and R4 removed.

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3 Schematic

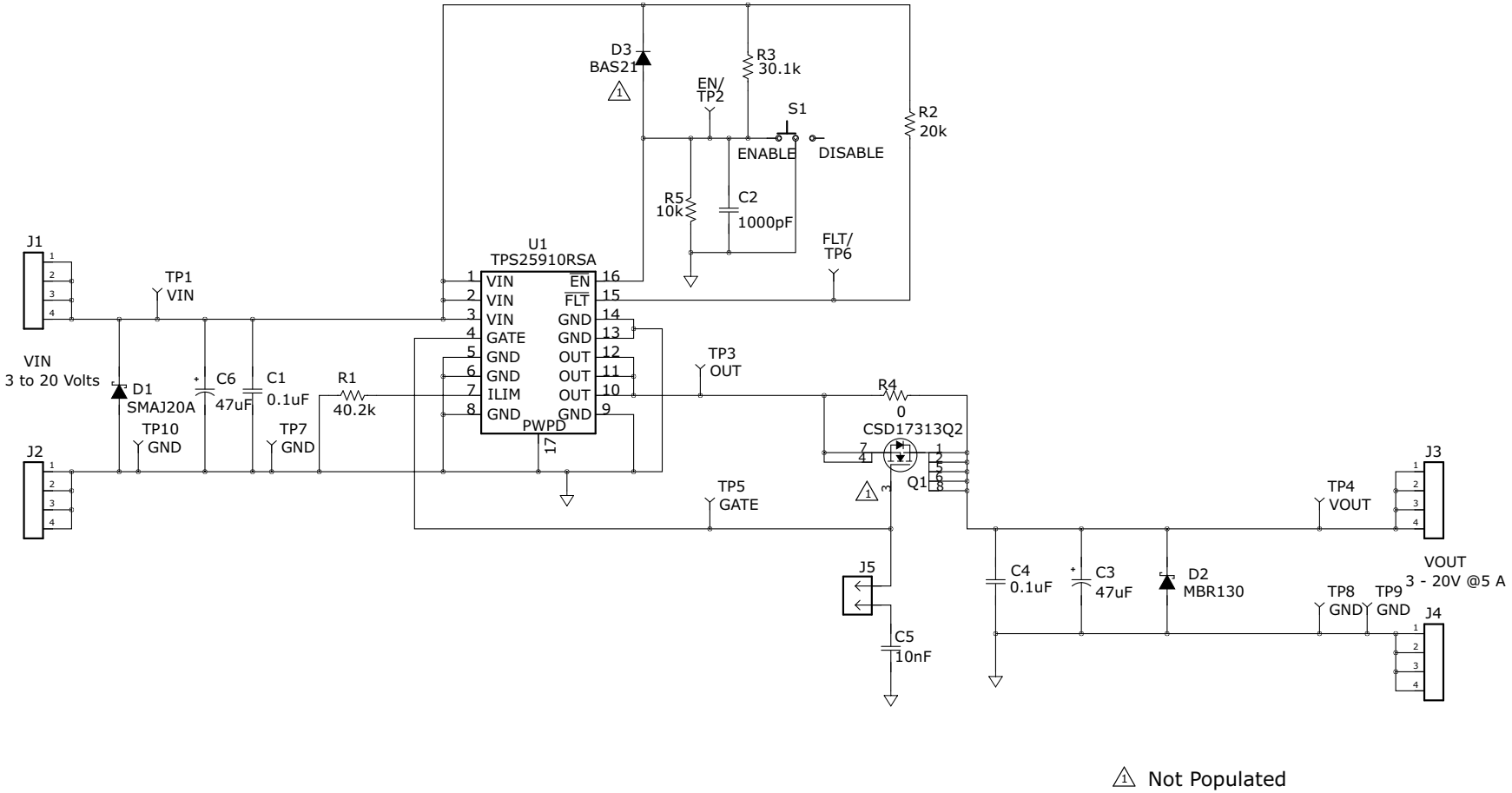


Figure 1. TPS25910EVM-088 Schematic

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4 General Configuration and Description

4.1 Physical Access

Table 1 lists the EVM connector functionality, Table 2 describes the test point availability and Table 3 describes the jumper functionality.

Table 1. Connector Functionality

Connector	Label	Description
J1/J2	VIN/GND	3 V–20 V input to the EVM
J3/J4	VOUT/GND	3 V–20 V output from the EVM

Table 2. Test Points

Test Point	Color	Label	Description
TP1/TP10	WHT/WHT	VIN/GND	3 V–20 V input to the EVM
TP4/TP8/TP9	WHT/WHT/WHT	VOUT/GND/GND	3 V–20 V output from the EVM
TP2	WHT	$\overline{\text{EN}}$	Active-low $\overline{\text{ENABLE}}$ input
TP3	WHT	OUT	Output from TPS25910
TP5	WHT	GATE	GATE output for slew rate control
TP6	WHT	$\overline{\text{FLT}}$	Active low fault output

Table 3. Jumper

Jumper	Label	Description
J5	J5	Install shunt for slew rate control

4.2 Test Setup

Figure 2 shows a typical test setup for the EVM. Connect J1/J2 to the power supply and J3/J4 to the load.

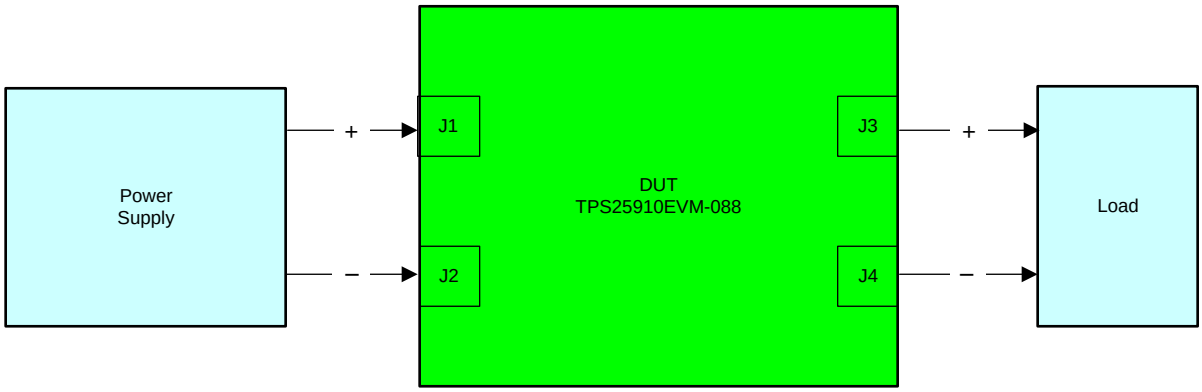


Figure 2. Typical TPS25910EVM-088 Test Setup

5 EVM Assembly Drawings and Layout Guidelines

5.1 PCB Drawings

The following figures show component placement and layout of the EVM.

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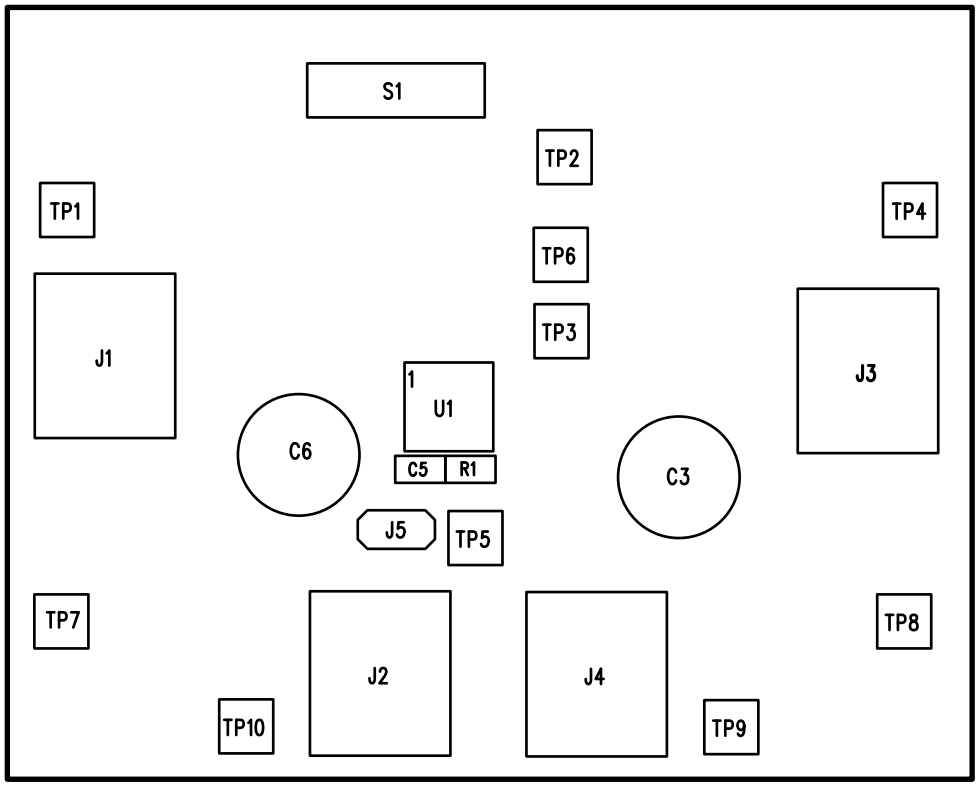


Figure 3. Top-Side Placement

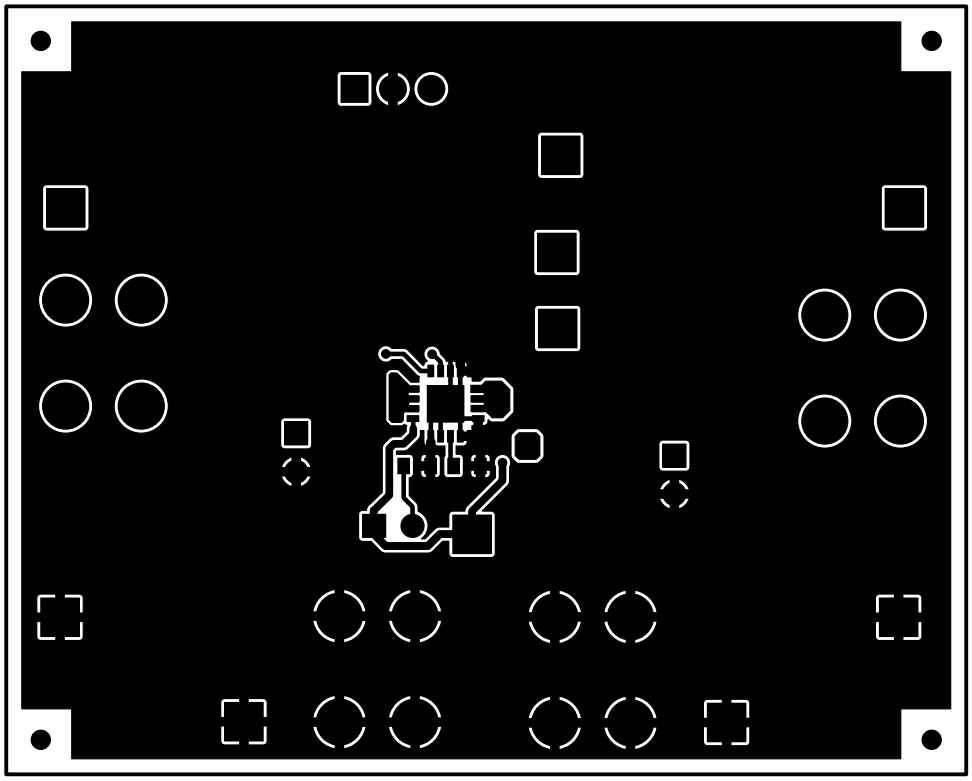


Figure 4. Top-Side Routing

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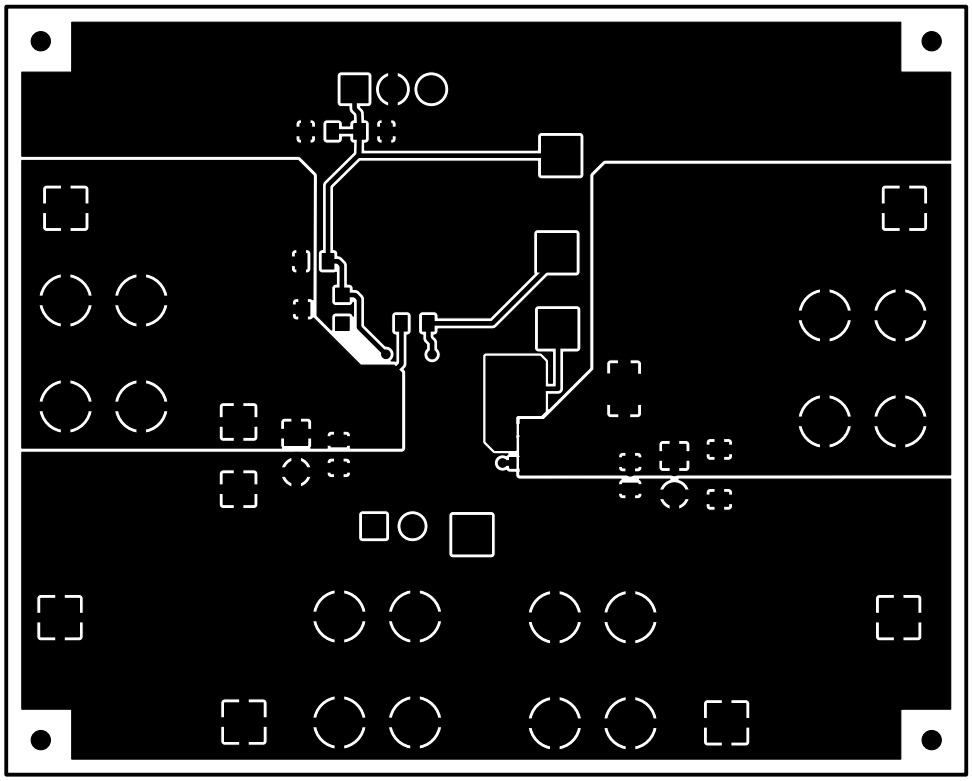


Figure 5. Bottom-Side Routing

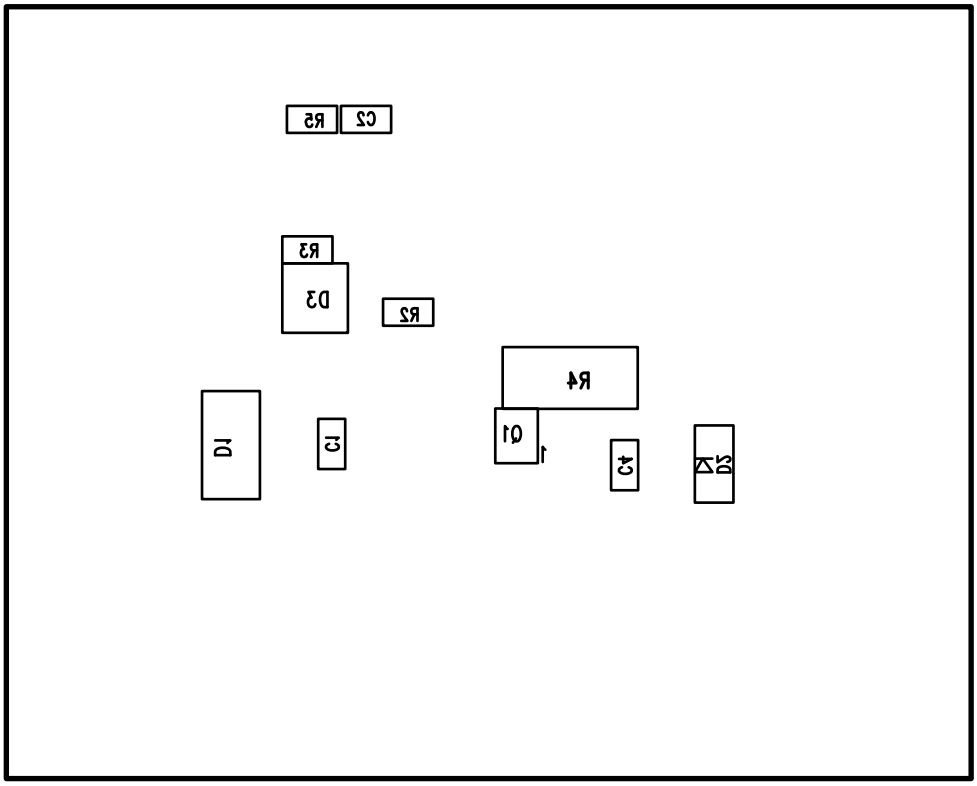


Figure 6. Bottom-Side Placement

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6 Bill of Materials

Table 4. TPS25910EVM-088 Bill of Materials

Count	RefDes	Value	Description	Size	Part Number	Supplier
2	C1 C4	0.1 µF	Capacitor, ceramic, 35 V, X7R, 10%	603	STD	STD
1	C2	1000 pF	Capacitor, ceramic, 25 V, X7R, 10%	603	STD	STD
1	C5	10 nF	Capacitor, ceramic, 35 V, X7R, 10%	603	STD	STD
2	C3 C6	47 µF	Capacitor, aluminum, 50 V, 20%	0.248 inch diameter	EKMG500ELL470MF11D	United Chemi-Con
0	D3	BAS21	Diode, switching, 200 mA, 200 V, 250 mW	SOT23	BAS21-7-F	Diodes
1	D2	MBR130	Diode, Schottky, 1000 mA, 30 V	SOD123	MBR130LSFT1G	ON Semi
1	D1	SMAJ20A	Diode, SMT TVS 400 W, 1 A, 20 V	SMA	SMAJ20A-13-F	Diodes
1	J5	PEC02SAAN	Header, male 2-pin, 100-mil spacing	0.100 in × 2	PEC02SAAN	Sullins
1	R4	0 Ω	Resistor, 0.0 Ω, 1 W	2512	STD	STD
1	R1	40.2 kΩ	Resistor, chip, 1/10W, 1%	603	STD	STD
1	R2	20 kΩ	Resistor, chip, 1/10W, 1%	603	STD	STD
1	R3	30.1 kΩ	Resistor, chip, 1/10W, 1%	603	STD	STD
1	R5	10 kΩ	Resistor, chip, 1/10W, 1%	603	STD	STD
1	S1	09.03201.02	Switch, SPDT, slide, PC-mount, 500 mA	0.400 × 0.100 in	09.03201.02	EAO
4	J1-4	7693	Screw terminal	0.310 × 0.310 in	7693	Keystone
10	TP1-10	5012	Test point, white, thru hole	0.125 × 0.125 in	5012	Keystone
1	U1	TPS25910RSA	IC, 3-V to 20-V integrated FET load switch	QFN-16	TPS25910RSA	TI
0	Q1	CSD17313Q2	Trans, N-Channel, 30 V, 5 A, 26 mΩ	SuperSOT-6	CSD17313Q2	TI
1	--		PCB, 2.5 in × 2.0 in × 0.062 in		PWR088	Any

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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.

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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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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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