

## **TS3DDR4000 EVM User's Guide**

This document is the EVM User's guide for the TS3DDR4000-EVM which provides an easy evaluation of TI's 12-bit 1:2 high speed DDR3/DDR3/DDR4 switch/multiplexer.

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## 1 About this Manual

This user's guide describes the TS3DDR4000 evaluation module (EVM) and its intended use. This guide contains the EVM schematics, bill of materials, and board layer information.

## 2 Information About Cautions and Warnings

The information in a caution or a warning is provided for personal protection. Read each caution and warning carefully.



### CAUTION

This EVM contains components that can potentially be damaged by electrostatic discharge. Always transport and store the EVM in its supplied ESD bag when not in use. Handle using an antistatic wristband. Operate on an antistatic work surface. For more information on proper handling, see the *Electrostatic Discharge (ESD)* application note ([SSYA008](#)).

### 3 Introduction

The TS3DDR4000-EVM is an evaluation module for TI's 12-bit, 1:2 high-speed DDR3/DDR3/DDR4 switch/multiplexer. The EVM allows for easy evaluation of the control inputs and connectivity. This EVM is not designed for high speed signal integrity evaluation.

#### 3.1 List of Hardware Items for Operation

The following items are required for EVM evaluation:

- TS3DDR4000-EVM
- Power Supply

Figure 1 illustrates the TS3DDR4000-EVM board.

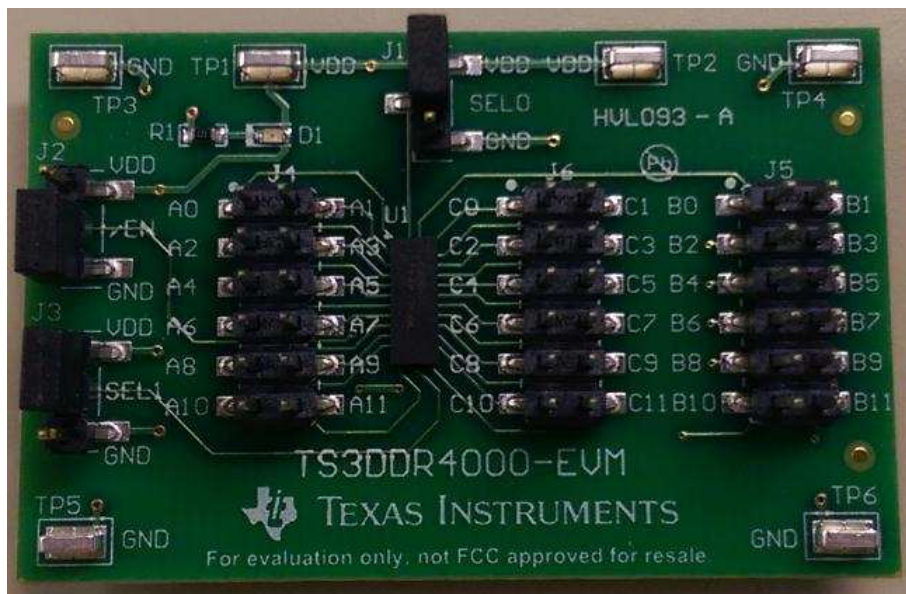


Figure 1. TS3DDR4000-EVM

## 4 TS3DDR4000-EVM Connections Overview

### 4.1 TS3DDR4000 Breakout Connections

All the data lines for the TS3DDR4000 are broken out to header test points for easy evaluation of DC performance. The A data lines are broken out to J4, B data lines to J5, and C data lines to J6.

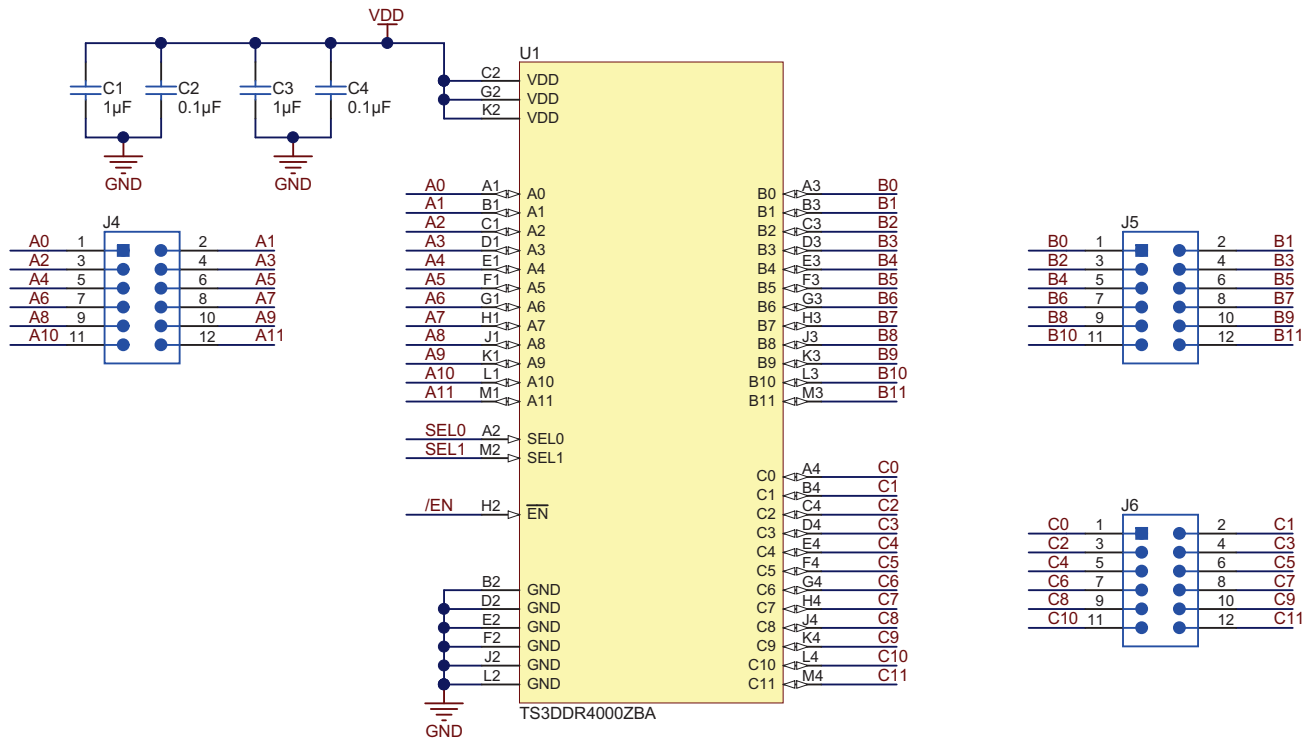


Figure 2. TS3DDR4000 Breakout Connections

All pins are labeled in silkscreen for easy reference as shown in Figure 3.

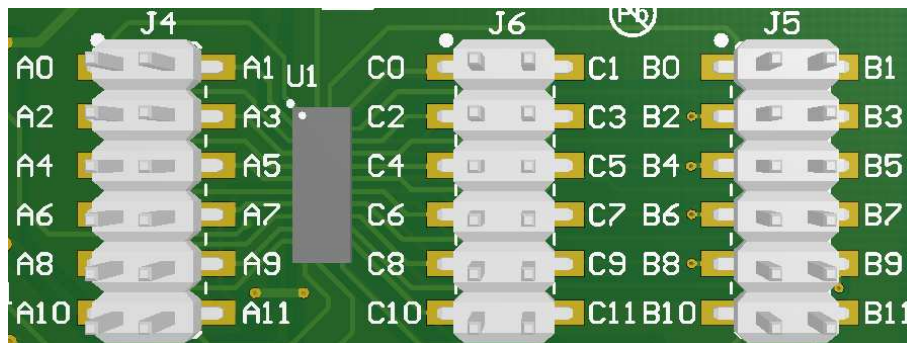


Figure 3. Silkscreen Labeling of Data Lines

### 4.2 Power

The TS3DDR4000 EVM requires an external supply to operate. When powered, the power consumption of the board will be less than 10 mA. When power is connected, the power indicator LED D1 will be lit.

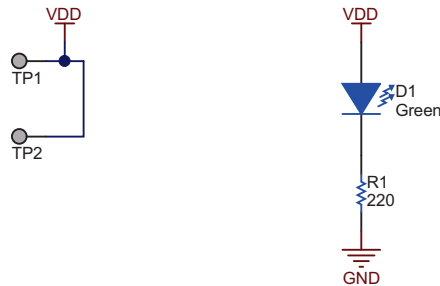


Figure 4. VDD Input and Indicator Diode

Ground test points

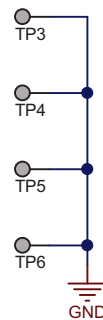


Figure 5. Ground Test Points

### 4.3 Select and Enable Jumper Operation

Jumpers J1, J2, and J3 provide an easy means of selecting a high or low input to these. Using included jumpers with the EVM, short pins 1 and 2 to connect the pin to VDD. Short pins 2 and 3 to connect the pin to ground. Table 1 contains the logic control information for the select and enable lines.

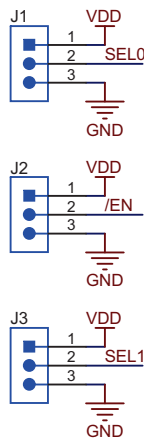


Figure 6. SEL0, SEL1, /EN Jumpers

**Table 1. Logic Control**

Control Pins			Jumper Position <sup>(1)</sup>			Function
/EN	SEL0	SEL1	J1	J2	J3	
H	-	-	-	1-2	-	Power-down mode All channels OFF (isolated)
L	L	L	2-3	2-3	2-3	Port A to Port B ON Port A to Port C OFF (isolated)
L	L	H	2-3	2-3	1-2	B[0, 1, 4, 5, 8, 9] MM A[0, 1, 4, 5, 8, 9] A[2, 3, 6, 7, 10, 11] MM C[2, 3, 6, 7, 10, 11] All other channels OFF (isolated)
L	H	L	1-2	2-3	2-3	A[0, 1, 4, 5, 8, 9] MM C[0, 1, 4, 5, 8, 9] A[2, 3, 6, 7, 10, 11] MM B[2, 3, 6, 7, 10, 11] All other channels OFF (isolated)
L	H	H	1-2	2-3	1-2	Port A to Port B OFF (isolated) Port A to Port C ON

<sup>(1)</sup> Jumper position indicates which pins are shorted. If pins 1-2 are shorted that select/enable lines is connected to VDD. If pins 2-3 are shorted that select/enable lines is connected to ground.

## 5 Board Documentation

This section contains the schematic, bill of materials, and printed-circuit board (PCB) layouts.

### 5.1 Schematic

Figure 7 shows the TS3DDR4000 EVM schematic.

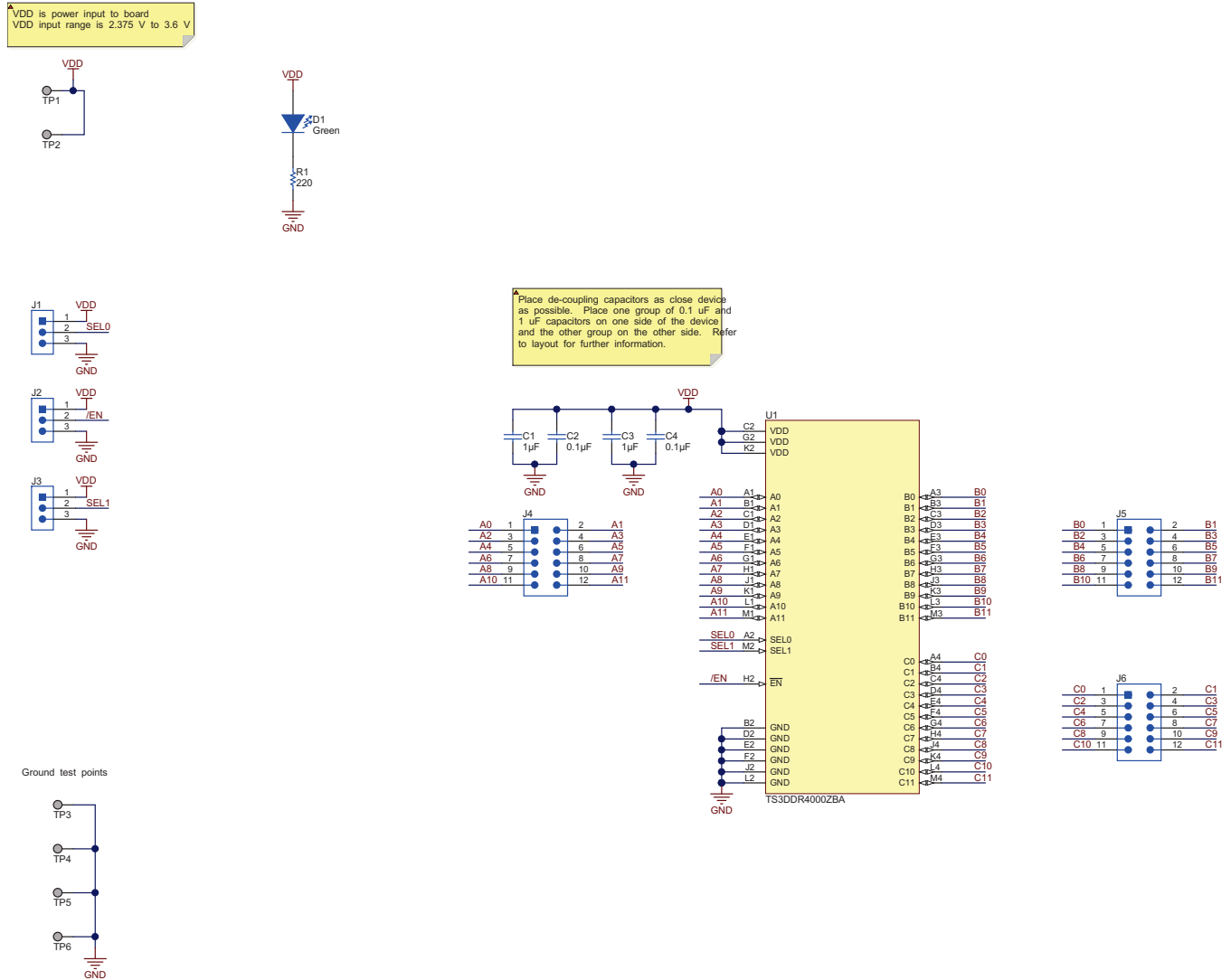


Figure 7. TS3DDR4000 EVM Schematic

## 5.2 Bill of Materials

Table 2 lists the TS3DDR4000 EVM BOM.

**Table 2. TS3DDR4000 EVM Bill of Materials**

Designator	Qty	Value	Description	Package Reference	Part Number	Manufacturer
!PCB1	1		Printed Circuit Board		HVL093	Any
C1, C3	2	1uF	CAP, CERM, 1uF, 6.3V, +/-10%, X7R, 0603	0603	GRM188R70J105KA01D	MuRata
C2, C4	2	0.1uF	CAP, CERM, 0.1uF, 6.3V, +/-10%, X7R, 0603	0603	GRM188R70J104KA01D	MuRata
D1	1	Green	LED, Green, SMD	1.6x0.8x0.8mm	LTST-C190GKT	Lite-On
FID4, FID5, FID6	3		Fiducial mark. There is nothing to buy or mount.	Fiducial	N/A	N/A
H1, H2, H3, H4	4		Bumpon, Hemisphere, 0.44 X 0.20, Clear	Transparent Bumpon	SJ-5303 (CLEAR)	3M
J1, J2, J3	3		Header, 100mil, 3x1, Gold, SMT	Samtec_TSM-103-01-X-SV	TSM-103-01-L-SV	Samtec
J4, J5, J6	3		Header, 100mil, 6x2, SMT	Header, 6x2, SMT	0015912120	Molex
R1	1	220	RES, 220 ohm, 5%, 0.1W, 0603	0603	CRCW0603220RJNEA	Vishay-Dale
SH-J1, SH-J2, SH-J3	3	1x2	Shunt, 100mil, Gold plated, Black	Shunt	969102-0000-DA	3M
TP1, TP2, TP3, TP4, TP5, TP6	6		Test Point, Miniature, SMT	Test Point, Miniature, SMT	5019	Keystone
U1	1		12-bits 1:2 High Speed DDR2/DDR3/DDR4 Switch/Multiplexer, ZBA0048A	ZBA0048A	TS3DDR4000ZBA	Texas Instruments
FID1, FID2, FID3	0		Fiducial mark. There is nothing to buy or mount.	Fiducial	N/A	N/A



### 5.3 PCB Layout

Figure 8 through Figure 9 illustrate the TS3DDR4000 EVM PCB layouts.

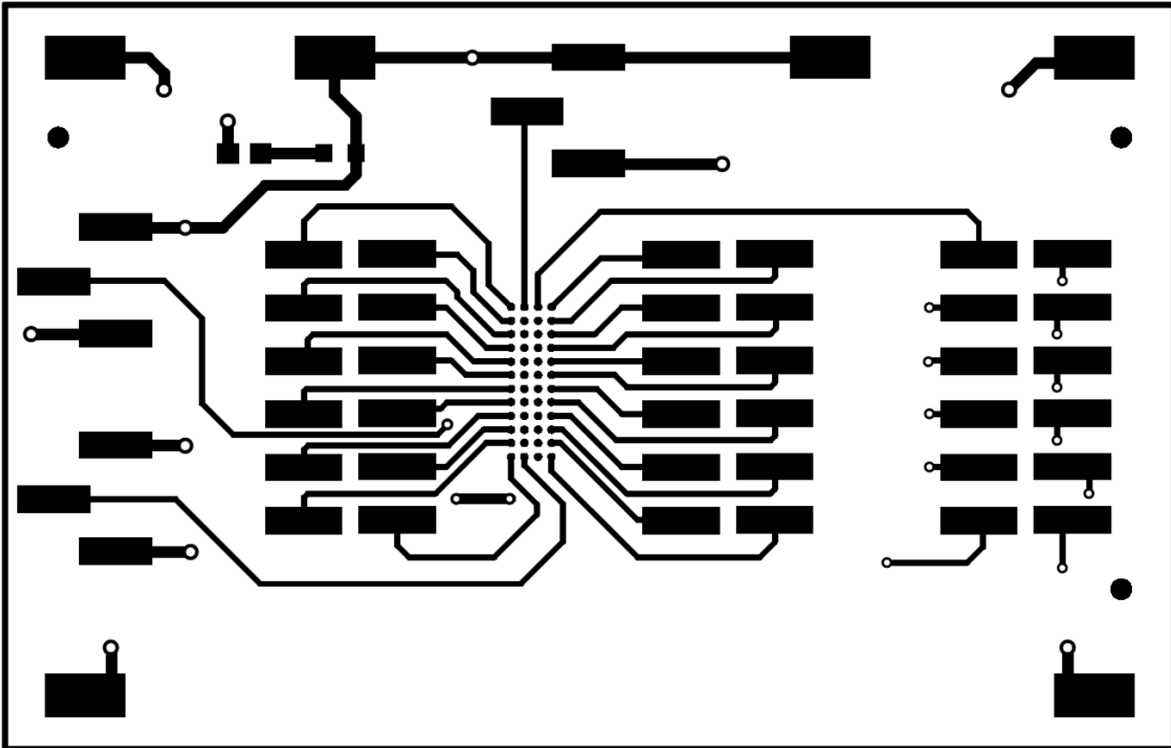


Figure 8. Top Copper

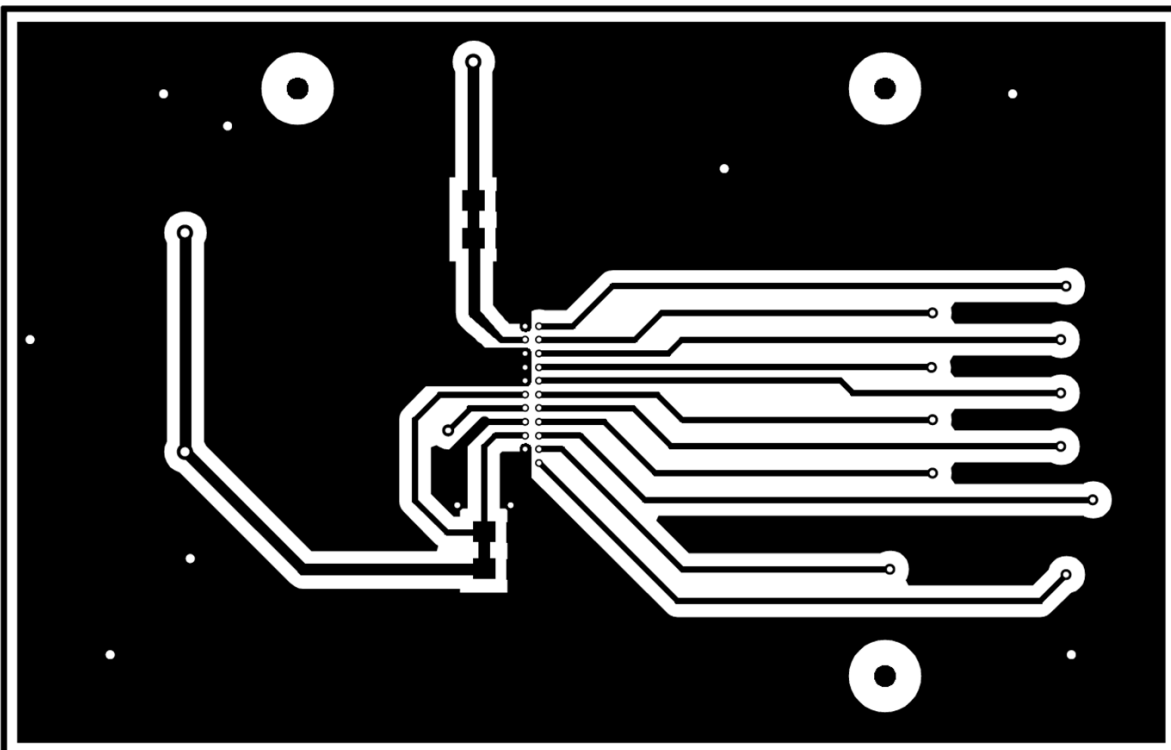


Figure 9. Bottom Copper

## 6 Related Documentation

- Product page: <http://www.ti.com/product/TS3DDR4000>
- TS3DDR4000 Datasheet ([SCDS356](#))
- Link to tools: <http://www.ti.com/product/TS3DDR4000/toolssoftware>

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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

#### Concerning EVMs Including Radio Transmitters:

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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.

#### Concerning EVMs Including Detachable Antennas:

Under Industry Canada regulations, this radio transmitter may only operate using an antenna of a type and maximum (or lesser) gain approved for the transmitter by Industry Canada. To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (e.i.r.p.) is not more than that necessary for successful communication. This radio transmitter has been approved by Industry Canada to operate with the antenna types listed in the user guide with the maximum permissible gain and required antenna impedance for each antenna type indicated. Antenna types not included in this list, having a gain greater than the maximum gain indicated for that type, are strictly prohibited for use with this device.

#### Concernant les EVMs avec antennes détachables

Conformément à la réglementation d'Industrie Canada, le présent émetteur radio peut fonctionner avec une antenne d'un type et d'un gain maximal (ou inférieur) approuvé pour l'émetteur par Industrie Canada. Dans le but de réduire les risques de brouillage radioélectrique à l'intention des autres utilisateurs, il faut choisir le type d'antenne et son gain de sorte que la puissance isotrope rayonnée équivalente (p.i.r.e.) ne dépasse pas l'intensité nécessaire à l'établissement d'une communication satisfaisante. Le présent émetteur radio a été approuvé par Industrie Canada pour fonctionner avec les types d'antenne énumérés dans le manuel d'usage et ayant un gain admissible maximal et l'impédance requise pour chaque type d'antenne. Les types d'antenne non inclus dans cette liste, ou dont le gain est supérieur au gain maximal indiqué, sont strictement interdits pour l'exploitation de l'émetteur.

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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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