

## **TS5MP646EVM User's Guide**

This document is the EVM User's guide for the TS5MP646EVM which provides an easy evaluation of TI 10-channel, 2:1 SPDT multiplexer optimized for MIPI applications.

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### **Trademarks**

All trademarks are the property of their respective owners.

## 1 About this Manual

This user's guide describes the TS5MP646 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 TS5MP646EVM provides break a out to test points which allows quick DC functional evaluation of the TS5MP646, 2:1 SPDT multiplexer. The board is easy to use only requiring one 3.3 V supply and the control logic is toggled using 100 mil jumpers.

#### 3.1 List of Hardware Items for Operation

The following items are required for EVM evaluation:

- TS5MP646EVM
- Power Supply

Figure 1 illustrates the TS5MP646-EVM board.

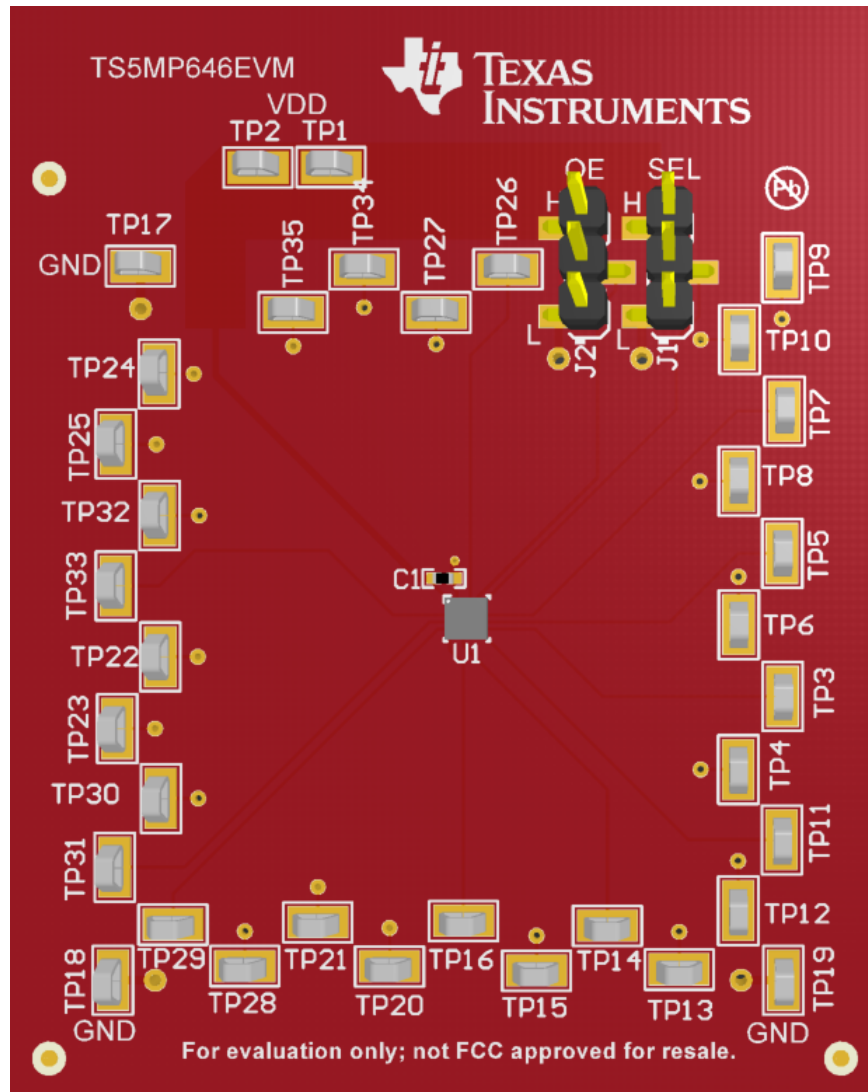


Figure 1. TS5MP646-EVM

## 4 TS5MP646-EVM Connections Overview

### 4.1 TS5MP646 Breakout Connections

All the signal paths for the TS5MP646 are broken out to test points for easy DC functional evaluation. The control logic pins can be controlled using the 100 mil jumpers on J1 and J2

### 4.2 Power

The TS5MP646EVM requires an external supply set between 2.3 V to 4.8 V on the VDD connector (TP1 or TP2) to operate. The power consumption of the board is less than 1 mA.

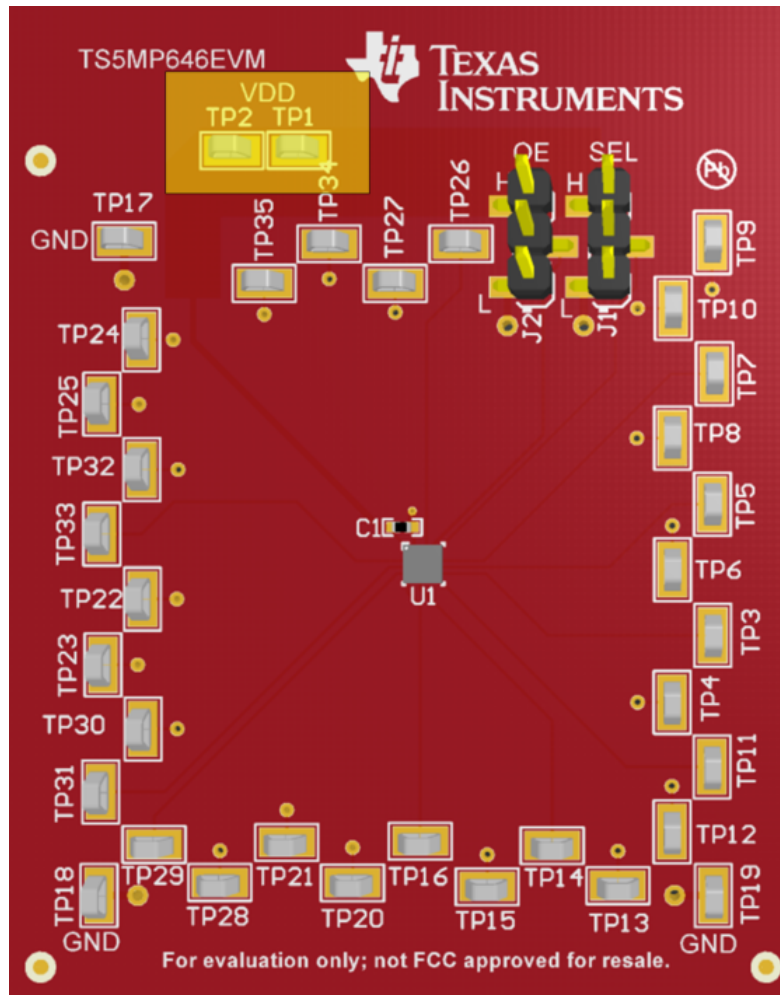


Figure 2. VDD Input

### 4.3 Select and Enable Jumper Operation

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

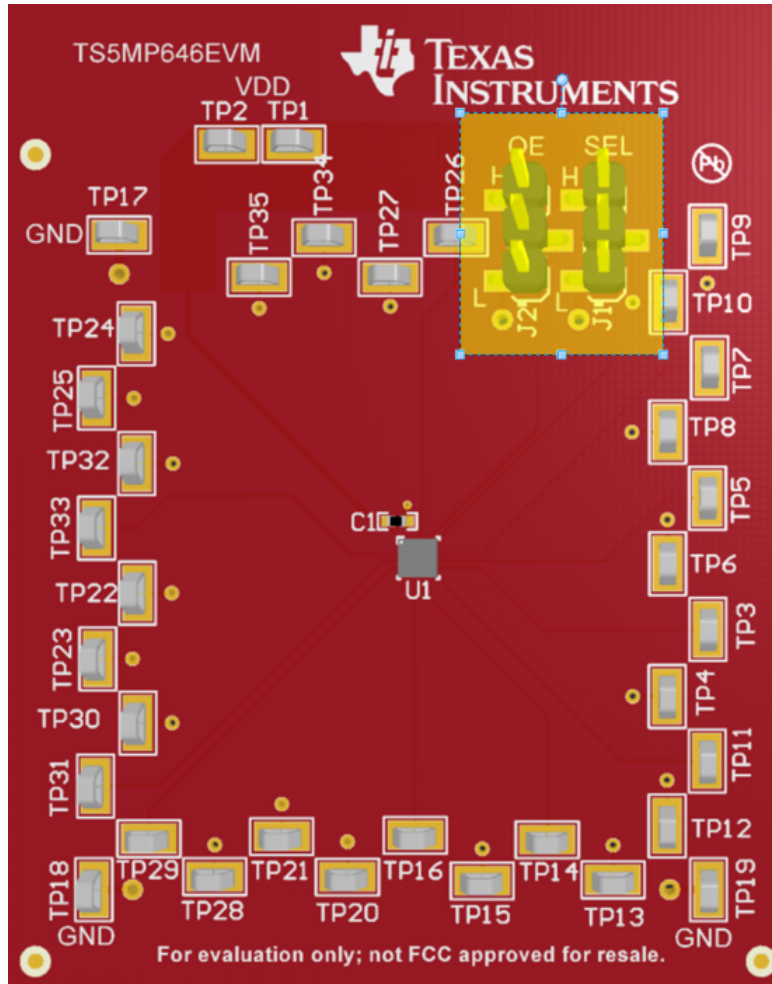


Figure 3. SEL0, SEL1,  $\bar{E}N$  Jumpers

Table 1. Logic Control

Control Pins		Function
J1 OE	J2 SEL	
H	-	Power-down mode All channels Hi-Z (isolated)
L	L	Common Ports to Port A (ON) Common Ports to Port B Hi-Z (isolated)
L	H	Common Ports to Port B (ON) Common Ports to Port A Hi-Z (isolated)

## 5 Board Documentation

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

### 5.1 Schematic

Figure 4 shows the TS5MP646 EVM schematic.

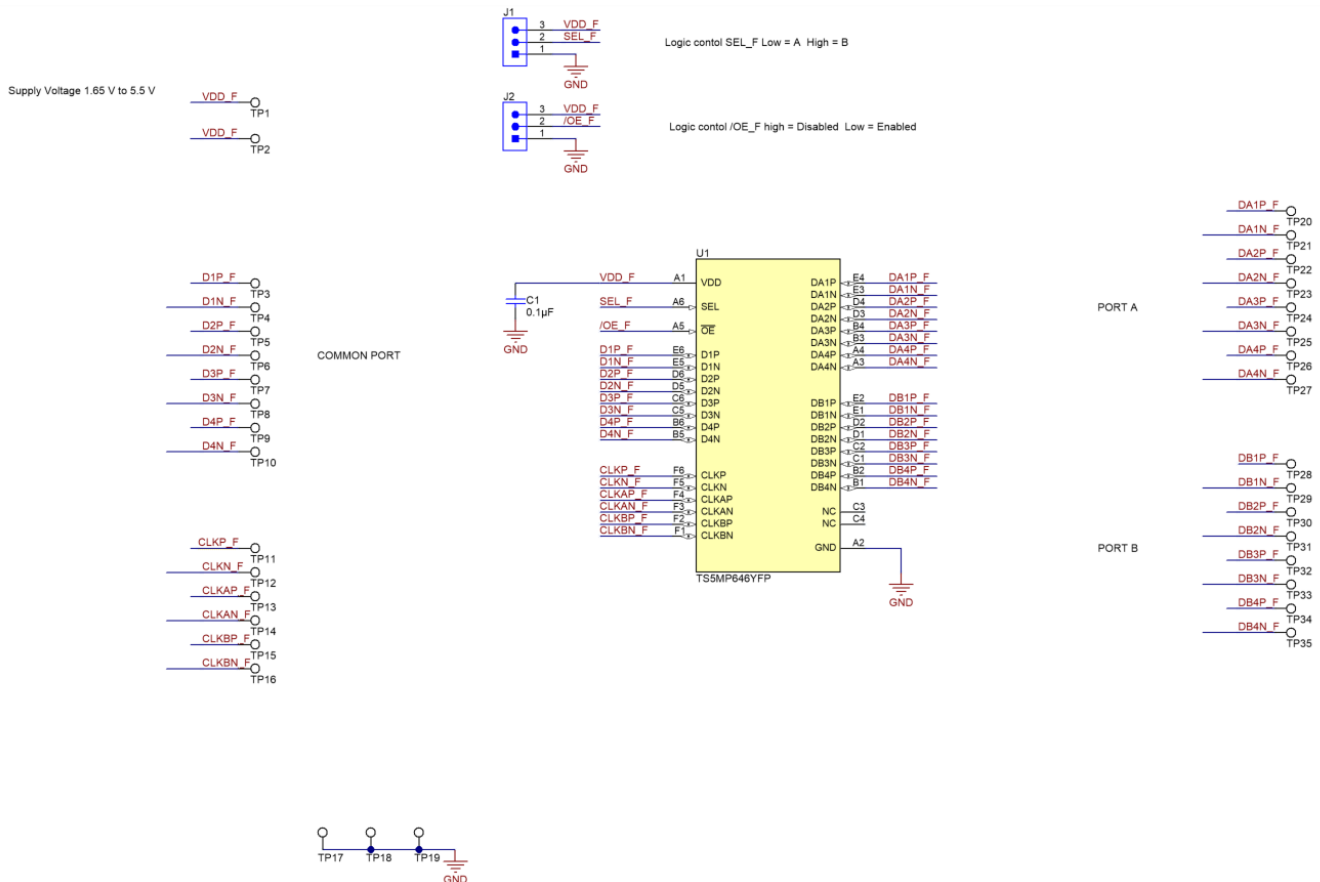


Figure 4. TS5MP646EVM Schematic

## 5.2 Bill of Materials

Table 2 lists the TS5MP646 EVM BOM.

**Table 2. TS5MP646 EVM Bill of Materials**

Designator	Qty	Value	Description	Package Reference	Part Number	Manufacturer
PCB1	1		Printed Circuit Board		INT091	Any
C1	1	0.1uF	CAP, CERM, 0.1 $\mu$ F, 10 V, +/- 20%, X5R, 0402	0402	885012105010	Würth Elektronik
J1, J2	2		Header, 2.54mm, 3x1, Gold, SMT	Header, 2.54mm, 3x1, SMT	M20-8770342	Harwin
SH-J1, SH-J2	2	1x2	Shunt, 100mil, Flash Gold, Black	Closed Top 100mil Shunt	SPC02SYAN	Sullins Connector Solutions
TP1, TP2, TP3, TP4, TP5, TP6, TP7, TP8, TP9, TP10, TP11, TP12, TP13, TP14, TP15, TP16, TP17, TP18, TP19, TP20, TP21, TP22, TP23, TP24, TP25, TP26, TP27, TP28, TP29, TP30, TP31, TP32, TP33, TP34, TP35	35		Test Point, Miniature, SMT	Testpoint_Keystone_Min iature	5015	Keystone
U1	1		4 Data Lane 2:1 MIPI Switch, YFP0036ACAC (DSBGA-36)	YFP0036ACAC	TS5MP646YFP	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 5 through Figure 9 illustrate the TS5MP646 EVM PCB layouts.

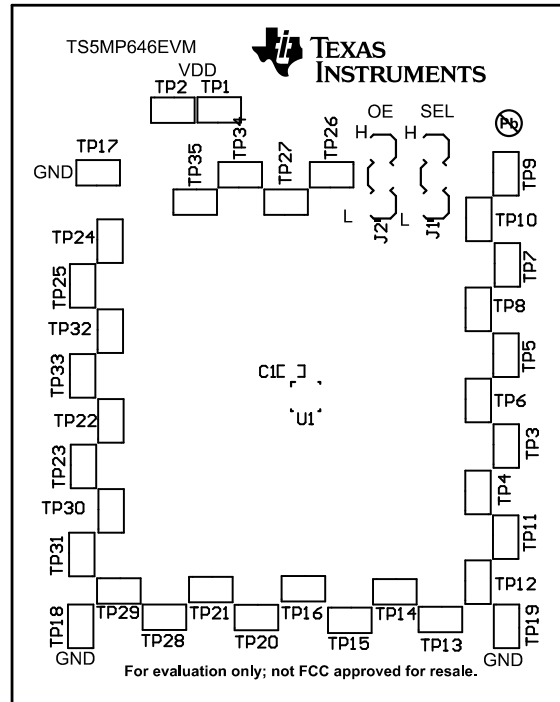


Figure 5. Sop Silk Screen

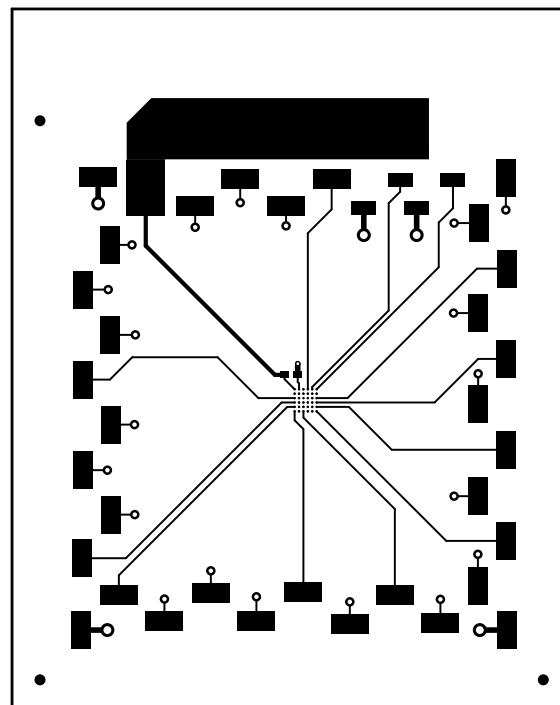


Figure 6. Top Layer



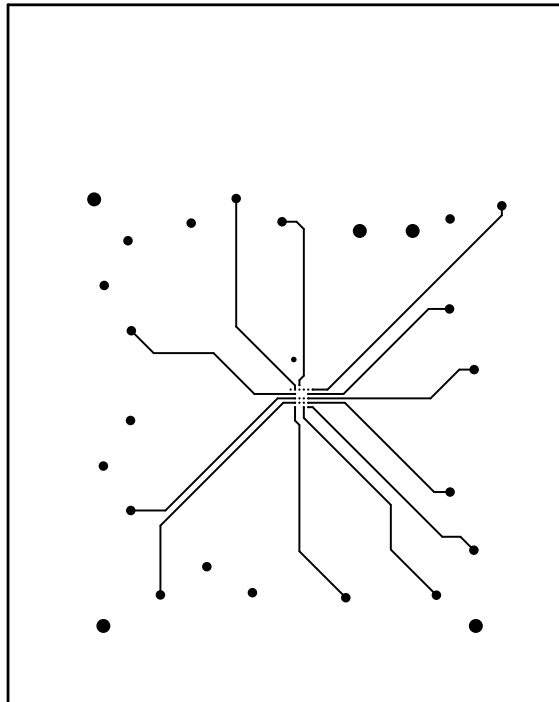


Figure 7. Layer 2

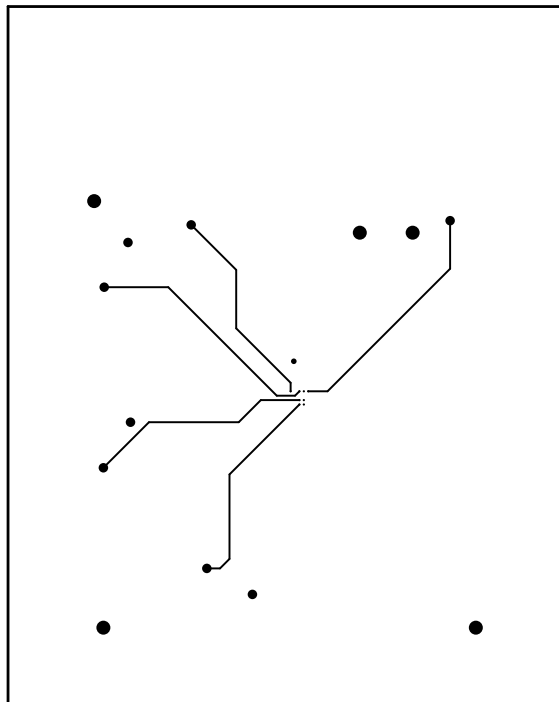
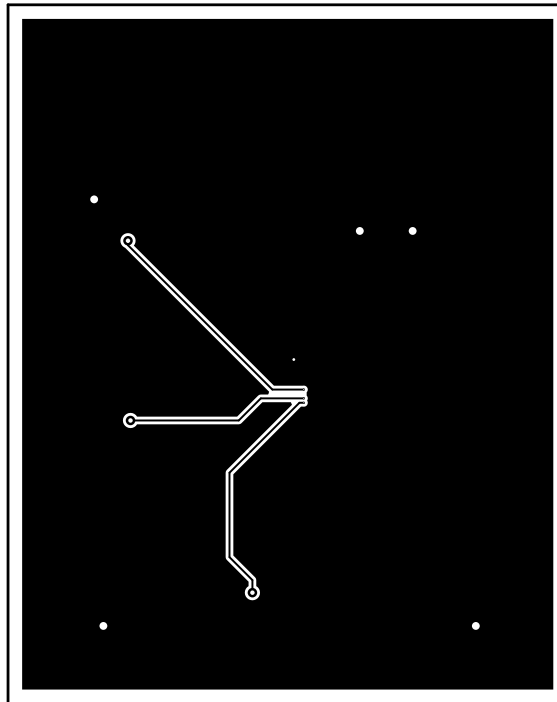


Figure 8. Layer 3



**Figure 9. Bottom Copper**

## 6 Related Documentation

- Product page: <http://www.ti.com/product/TS5MP646>
- TS5MP646 Datasheet (*TS5MP64x 2:1 MIPI 4-Data Lane Switch, SCDS356*)
- Link to tools: <http://www.ti.com/product/TMUX136/toolssoftware>

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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.

### FCC Interference Statement for Class A EVM devices

*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.*

## FCC Interference Statement for Class B EVM devices

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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 or RSS-247

### Concerning EVMs Including Radio Transmitters:

This device complies with Industry Canada license-exempt RSSs. 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.

### 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.

## 3.3 Japan

3.3.1 *Notice for EVMs delivered in Japan:* Please see [http://www.tij.co.jp/lstds/ti\\_ja/general/eStore/notice\\_01.page](http://www.tij.co.jp/lstds/ti_ja/general/eStore/notice_01.page) 日本国内に輸入される評価用キット、ボードについては、次のところをご覧ください。  
[http://www.tij.co.jp/lstds/ti\\_ja/general/eStore/notice\\_01.page](http://www.tij.co.jp/lstds/ti_ja/general/eStore/notice_01.page)

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If User uses EVMs in Japan, not certified to Technical Regulations of Radio Law of Japan, User is required to follow the instructions set forth by Radio Law of Japan, which includes, but is not limited to, the instructions below with respect to EVMs (which for the avoidance of doubt are stated strictly for convenience and should be verified by User):

1. Use EVMs 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 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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