User's Guide

TPS2117 Evaluation Module

ABSTRACT

This user's guide describes the characteristics, operation, and use of the TPS2117 low I_Q power MUX evaluation module (EVM). This document contains the complete EVM schematic diagram, printed-circuit board layouts, bill of materials, and necessary instructions on how to properly operate the EVM.

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Trademarks

1 Introduction

The TPS2117EVM is an evaluation module for the TPS2117 low I_Q power multiplexer. The TPS2117 is a dual-input, single-output device that can be configured for automatic or manual switchover. The low quiescent current makes the TPS2117 ideal for systems with a battery supply as an input to extend the life of the battery when in use.

1.1 Description

The TPS2117EVM is a two layer PCB that enables the evaluation of the TPS2117 low IQ power multiplexer. This EVM contains multiple jumpers to configure different modes of operation for the TPS2117. Table 1-1 lists the different modes of operation.

For additional details on power multiplexers and the data sheet for TPS2117, see power muxes on TI.com.

Table 1-1. TPS2117 Modes of Operation

EVM	Device	Modes of Operation	V_{OUT} Range	I_{OUT}MAX
TPS2117EVM	TPS2117	• Priority • Manual	1.6 V–5.5 V	4 A

1.2 Features

This EVM has the following features:

- 1.6-V–5.5-V voltage range for each input
- Multiple configurations for different modes of operation
- Various onboard loading conditions
- Test points on every pin of the TPS2117 for easy evaluation

2 Electrical Performance

See the TPS2117 data sheet for detailed characteristics.

3 TPS2117EVM Configurations

This section provides an overview of the TPS2117 evaluation board connector and jumpers. Table 3-1 describes the input and output connectors and jumpers. Table 3-2 describes the different test points and functinality. Table 3-3 describes the jumper functionality and configurations.

Table 3-1. TPS2117 Input and Output Connector Functionality

Input	Connector and Test Point	Label	Description
VIN1	J1	VIN1+	VIN1 Input connector
	TP1	VIN1	VIN1 input test point
	TP2	VIN1 SENSE	VIN1 SENSE test point
VIN2	J3	VIN2+	VIN2 Input connector
	TP3	VIN2	VIN2 input test point
	TP4	VIN2 SENSE	VIN2 SENSE test point
VOUT	J4	VOUT+	VOUT output connector
	TP5	VOUT SENSE	VOUT SENSE test point
	TP6	VOUT	VOUT output test point
GND	J2	GND	GND connector for inputs
	J5	GND	GND connector for output
	TP10, TP11, TP12, TP13	GND	Test point for GND

Table 3-2. TPS2117 Test Point Description

Input	Test point	Label	Description
VOUT	TP7	ST	Output status pin test point
VIN1	TP8	PR1	Priority test point for VIN1
	TP9	MODE	Mode pin test point

Table 3-3. TPS2117 Jumper Description

Input	Jumper	Label	Description
VIN1	JP1, JP2, JP3	1. 6V, 2.9V, 4.4V	Configures voltage divider for priority operation. The jumper labels denote the typical switchover voltage when the jumper is populated.
	JP4	JP4	Configures mode of operation • Position 1 and 2 sets MODE high for priority/manual mode
VOUT	JP5	JP5	Sets hysteresis • Position 1 and 2 disables hysteresis • Position 2 and 3 enables hysteresis
	JP6	JP6	1-µF output capacitor
	JP7	JP7	10-µF output capacitor
	JP8	JP8	100-µF output capacitor
	JP9	JP9	10-Ω output resistor

4 Schematic

Figure 4-1 illustrates the TPS2117EVM schematic.

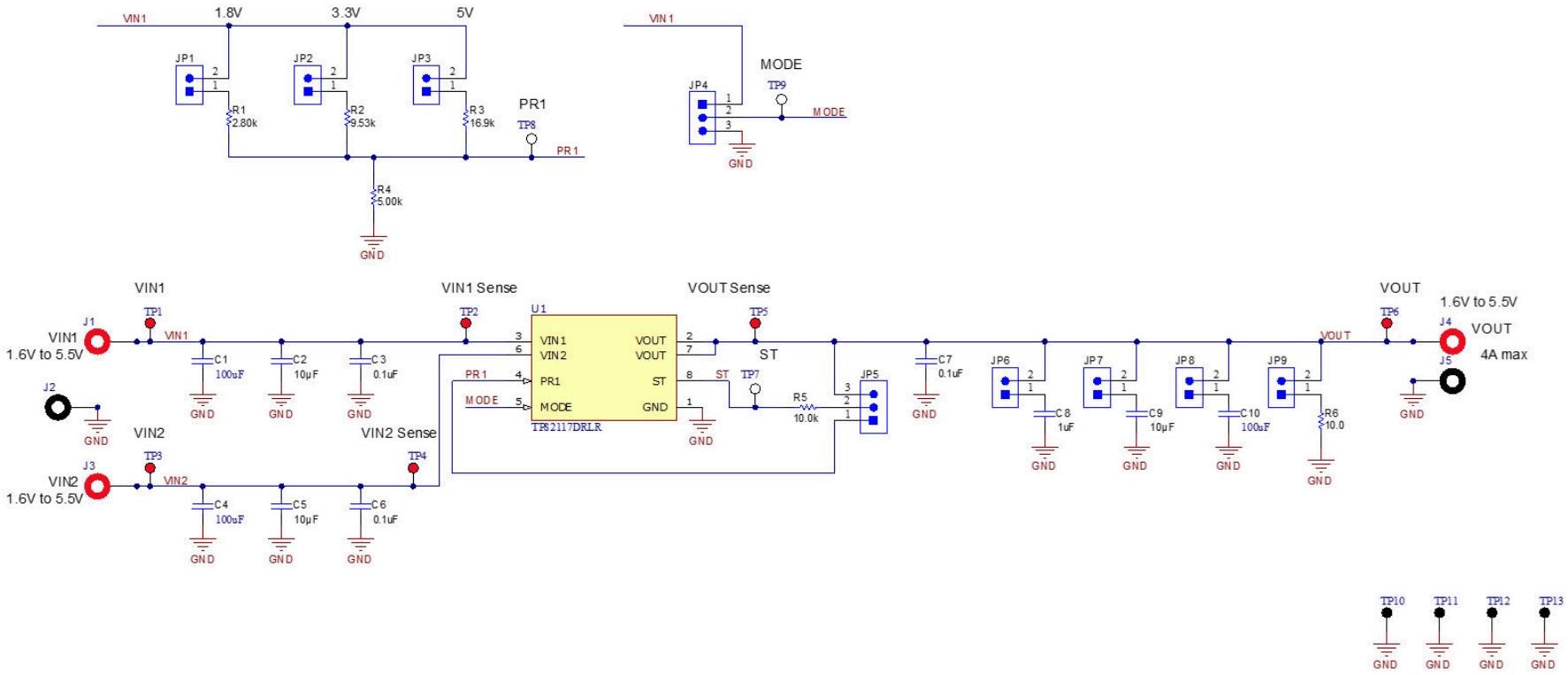

Figure 4-1. TPS2117EVM Schematic

5 PCB Layout

Figure 5-1 and Figure 5-2 show the TPS2117EVM PCB layout images.

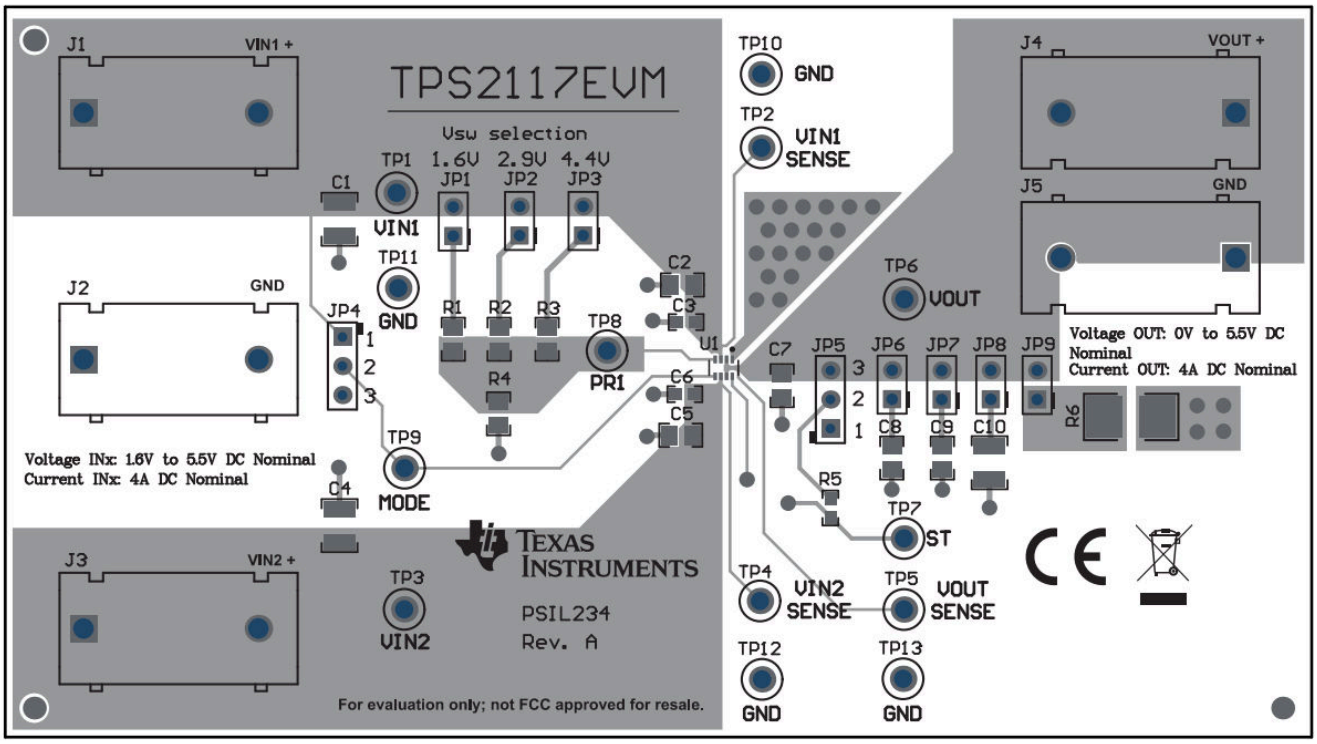

Figure 5-1. TPS2117 Top Layer

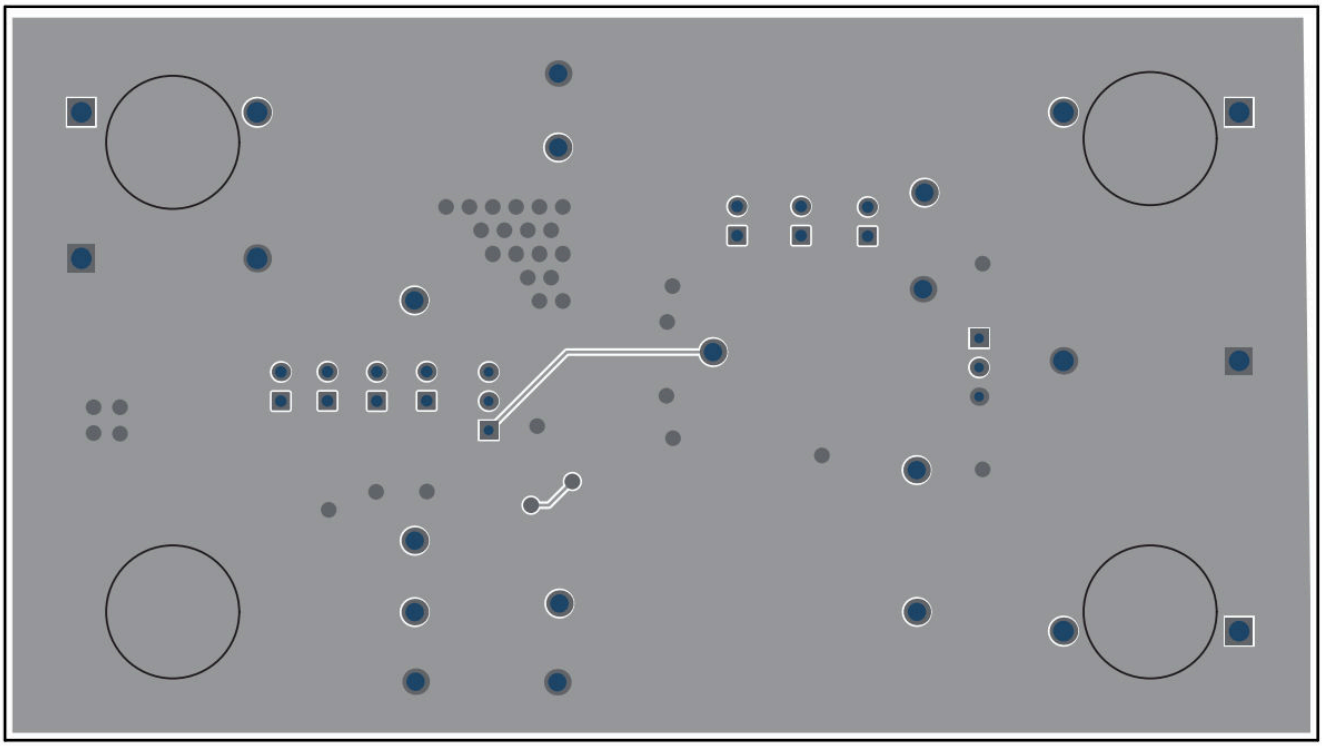

Figure 5-2. TPS2117 Bottom Layer

6 Test Setup

This chapter describes the default jumper test setup for the evalution of the TPS2117 using the evaluation module.

6.1 TPS2117EVM Test Equipment

Read the TPS2117 data sheet before using the EVM.

The following test equipment is recommended:

- Two adjustable power supplies, 0 V–6 V at 4-A maximum
- Oscilloscope
- A passive or active load

6.2 Setting up the TPS2117EVM

Make sure the TPS2117EVM has the default jumper settings described in Table 6-1.

Table 6-1. Default Jumper Settings

Jumper	Description	Position
JP3	Sets voltage divider for PR1	Install
JP6	1 µF	Install
JP9	10 Ω	Install
JP4	MODE	Position 1 and 2
JP5	ST	Position 2 and 3

7 Test Configuration

Figure 7-1 shows the test equipment setup for the TPS2117EVM.

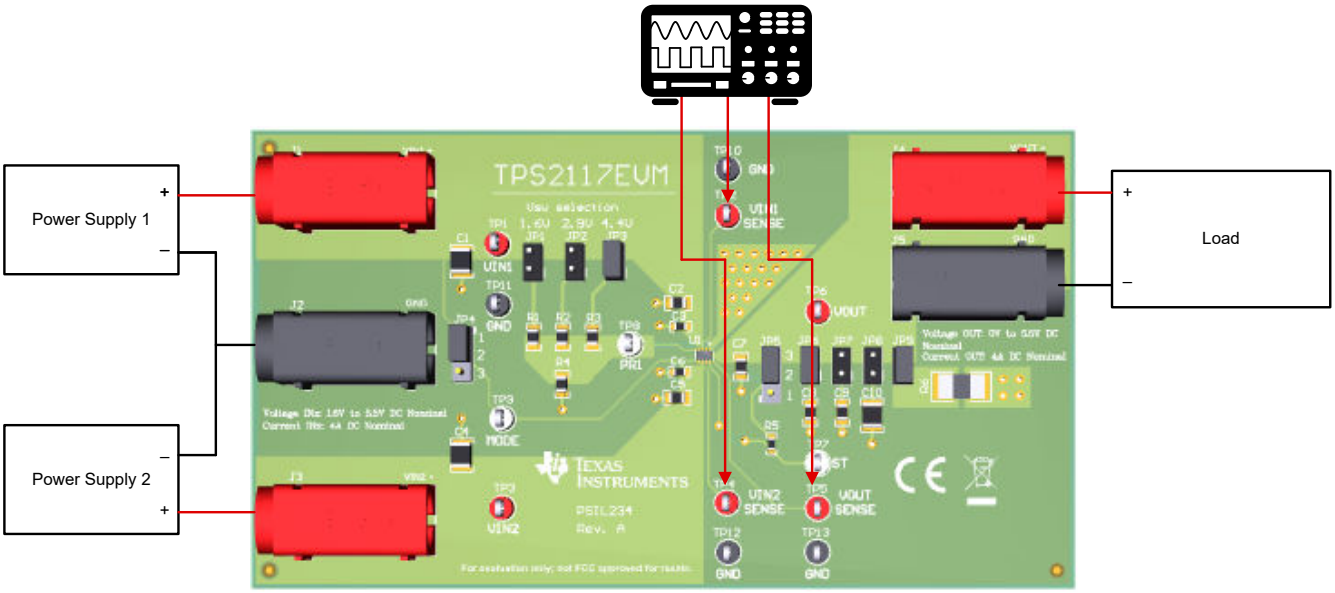

Figure 7-1. TPS2117 Setup With Test Equipment

8 Bill of Materials (BOM)

Table 8-1 lists the TPS2117EVM BOM.

Table 8-1. TPS2117EVM BOM

Designator	QTY	Value	Description	Package Reference	Part Number	Manufacturer
!PCB	1		Printed Circuit Board		PSIL234	Any
C1, C4, C10	3	100uF	CAP, CERM, 100 uF, 16 V, ±20%, X5R, 1210	1210	C1210C107M4PAC7800	Kemet
C2, C5, C9	3	10uF	CAP, CERM, 10 µF, 20 V, ±10%, X5R, 0805	0805	GRM21BR61D106KE15L	MuRata
C3, C6	2	0.1uF	CAP, CERM, 0.1 uF, 25 V, ±10%, X7R, 0603	0603	06033C104KAT2A	AVX
C7	1	0.1uF	CAP, CERM, 0.1 uF, 25 V, ±5%, X7R, 0805	0805	08053C104JAT2A	AVX
C8	1	1uF	CAP, CERM, 1 uF, 50 V, ±10%, X7R, 0805	0805	C0805C105K5RACTU	Kemet
FID1, FID2, FID3	3		Fiducial mark. There is nothing to buy or mount.	N/A	N/A	N/A
H9, H10, H11, H12	4		Bumpon, Hemisphere, 0.44 X 0.20, Clear	Transparent Bumpon	SJ-5303 (CLEAR)	3M
J1, J3, J4	3		Standard Banana Jack, insulated, 10A, red	571-0500	571-0500	DEM Manufacturing
J2, J5	2		Standard Banana Jack, insulated, 10A, black	571-0100	571-0100	DEM Manufacturing
JP1, JP2, JP3, JP6, JP7, JP8, JP9	7		Header, 100mil, 2x1, Tin, TH	Header, 2 PIN, 100mil, Tin	PEC02SAAN	Sullins Connector Solutions
JP4, JP5	2		Header, 100mil, 3x1, TH	Header, 3x1, 100mil, TH	800-10-003-10-001000	Mill-Max
R1	1	2.80k	RES, 2.80 k, 1%, 0.125 W, 0805	0805	CRCW08052K80FKEA	Vishay-Dale
R2	1	9.53k	RES, 9.53 k, 1%, 0.125 W, AEC-Q200 Grade 0, 0805	0805	ERJ-6ENF9531V	Panasonic
R3	1	16.9k	RES, 16.9 k, 1%, 0.125 W, 0805	0805	CRCW080516K9FKEA	Vishay-Dale
R4	1	5.00k	RES, 5.00 k, 0.1%, 0.2 W, 0805	0805	PNM0805E5001BST5	Vishay Thin Film
R5	1	10.0k	RES, 10.0 k, 0.5%, 0.1 W, 0603	0603	RT0603DRE0710KL	Yageo America
R6	1	10.0	RES, 10.0, 1%, 16 W, 2512	2512	CPA2512Q10R0FS-T10	Susumu Co Ltd
SH-J1, SH-J2, SH-J3, SH-J4, SH-J5	5	1x2	Shunt, 100mil, Flash Gold, Black	Closed Top 100mil Shunt	SPC02SYAN	Sullins Connector Solutions
TP1, TP2, TP3, TP4, TP5, TP6	6		Test Point, Multipurpose, Red, TH	Red Multipurpose Testpoint	5010	Keystone
TP7, TP8, TP9	3		Test Point, Multipurpose, White, TH	White Multipurpose Testpoint	5012	Keystone
TP10, TP11, TP12, TP13	4		Test Point, Multipurpose, Black, TH	Black Multipurpose Testpoint	5011	Keystone
U1	1		1.6 V to 5 V, 4-A Low IQ Power Mux With Manual and Automatic Switchover	DRL0008A	TPS2117DRLR	Texas Instruments

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3.1.2 *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

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 or RSS-247*

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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.

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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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https://www.ti.com/ja-jp/legal/notice-for-evaluation-kits-delivered-in-japan.html

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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):

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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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4.3.2 EVMs are intended solely for use by technically qualified, professional electronics experts who are familiar with the dangers and application risks associated with handling electrical mechanical components, systems, and subsystems. User assumes all responsibility and liability for proper and safe handling and use of the EVM by User or its employees, affiliates, contractors or designees. User assumes all responsibility and liability to ensure 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. User assumes all responsibility and liability for any improper or unsafe handling or use of the EVM by User or its employees, affiliates, contractors or designees.

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