EVM User's Guide: TPS2291L02-EVM

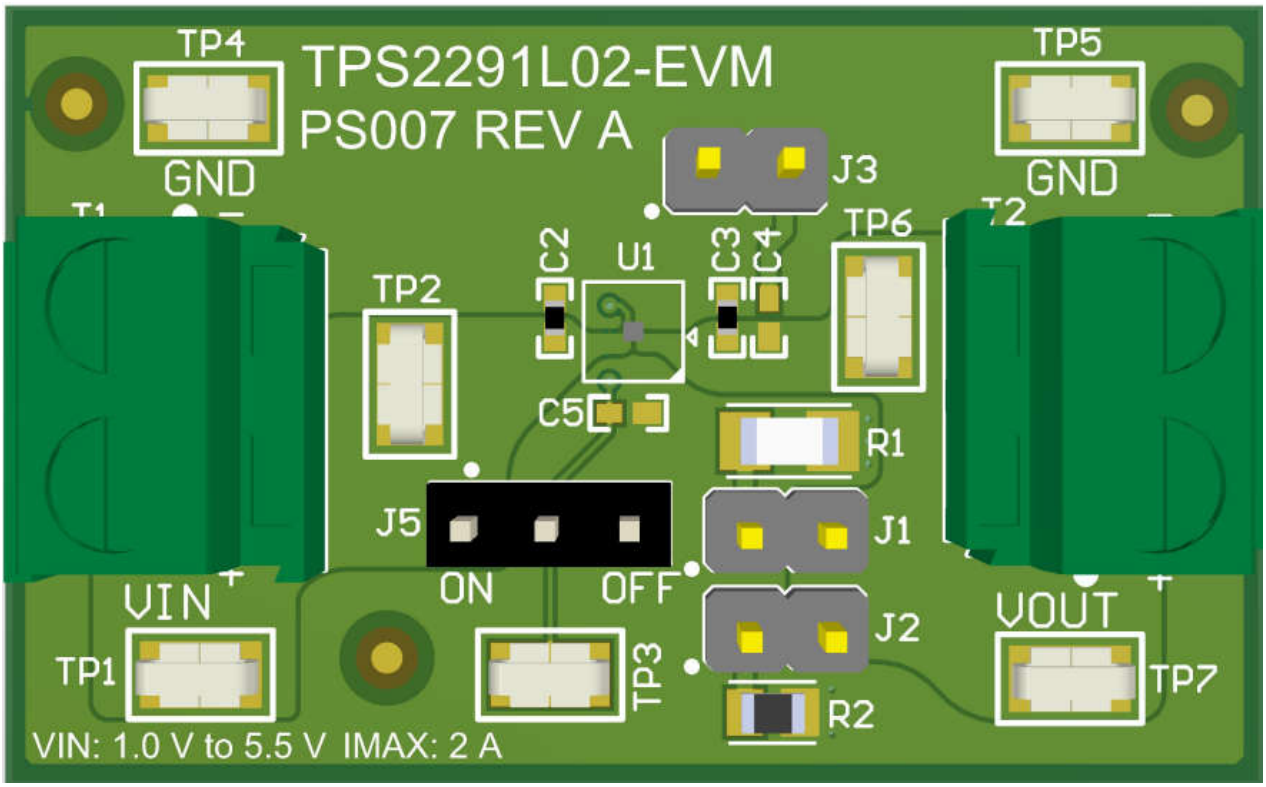
TPS2291L02 Evaluation Module

Description

The TPS2291L02-EVM is a printed circuit board (PCB) containing the TPS2291L02 load switch device. The VIN and VOUT connections to the device and the PCB layout routing are capable of handling high continuous currents and provide a low-resistance pathway into and out of the device under test. Test point connections allow the user to control the device with user-defined test conditions and make accurate RON measurements and VOUT slew rate.

Features

- V_{IN} input voltage range: 1V to 5.5V
- Access to the V_{IN}, V_{OUT}, EN and GND pins of the TPS2291L02 load switch device
- IMAX: 2A
- Onboard C_{IN} and C_{OUT} capacitors
- Onboard resistors for measuring V_{OUT} slew rate
- Small package size at 0.65mm × 0.65mm



1 Evaluation Module Overview

1.1 Introduction

This user's guide describes the characteristics, operation, and use of the TPS2291L02-EVM. This document contains the complete EVM schematic diagram, printed-circuit board layouts, bill of materials, and necessary instructions on how to operate the EVM.

1.2 Kit Contents

Table 1-1 lists the contents of the EVM kit. Contact the Texas Instruments Product Information Center nearest if any components are missing. TI highly recommends that users check the TI website at https://www.ti.com to verify that the latest versions of the related software is being used.

Table 1-1. Kit Contents

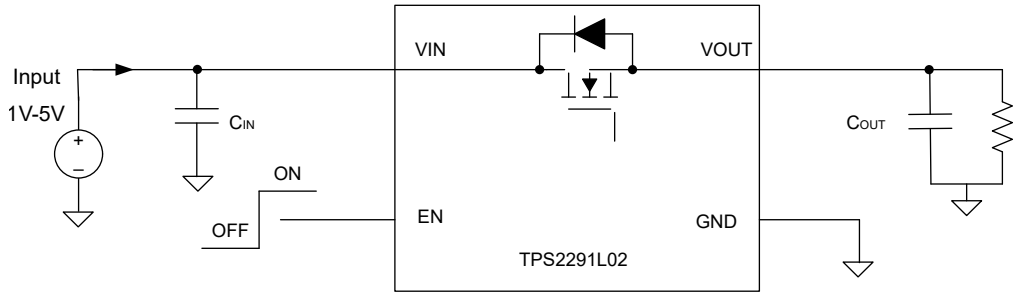
Item	Quantity
TPS2291L02-EVM	1
TPS2291L02BYCJR	1

1.3 Specification

Table 1-2 lists a short description of the TPS2291L02 load switch performance specification. For additional details on load switch performance, application notes, and device data sheets, see www.ti.com/loadswitch.

Table 1-2. TPS2291L02 Characteristics

EVM	Device	Rise Time Typical (µs)	V_{IN} (V)	Enable (ON Pin)	Quick Output Discharge Typical
PS007	TPS2291L02	Fixed	1.0V to 5.5V	Active High	Fixed



1.4 Device Information

The TPS2291L02 is a compact low IQ load switch with controlled turn on time . The device contains an N-channel MOSFET that can operate over an input voltage range of 1V to 5.5V and can support a maximum continuous current of 2A. The switch is controlled by an on and off input (ON), which is capable of interfacing directly with low voltage control signals. The TPS2291L02 also has a Quick Output Discharge when the switch is turned off, pulling the output voltage down to a known 0V state. The device is characterized for operation over the free-air temperature range of –40°C to +105°C.

2 Hardware

2.1 Setup

This section describes the jumpers and connectors on the EVM as well as how to properly connect, set up and use the EVM. Table 2-1 describes the different test points and functionality. Table 2-2 describes the jumper functionality and configurations.

Table 2-1. TPS2291L02-EVM Test Point Description

Pin	Test Point	Label	Description
VIN	TP1	VIN	Input voltage test point
VIN	TP2	VIN Sense	Input voltage Sense test point
ON/EN	TP3	ON	EN/ON voltage test point
VOUT	TP7	VOUT	Output voltage test point
VOUT	TP6	VOUT Sense	Output voltage Sense test point

Table 2-2. TPS2291L02-EVM Jumper Configuration

Input	Jumper	Label	Description
EN	J5	ON-OFF	ON-pin enable signal • Position 1 and 2 pulls ON-pin to VIN • Position 2 and 3 pulls ON-pin to GND
C4	J3	J3	Jumper to connect COUT
R1	J1	J1	Jumper to connect 100 Ohms load resistance
R2	J2	J2	Jumper to connect 1K Ohms load resistance

3 Implementation Results

3.1 Electrical Performance

See the *TPS22991L02 5.5V, 2A, 22mΩ On-Resistance Ultra Low IQ Load Switch with Quick Output discharge* data sheet for detailed electrical characteristics of the *TPS2291L02*.

3.2 Test Configurations

3.2.1 Rise Time Test Setup

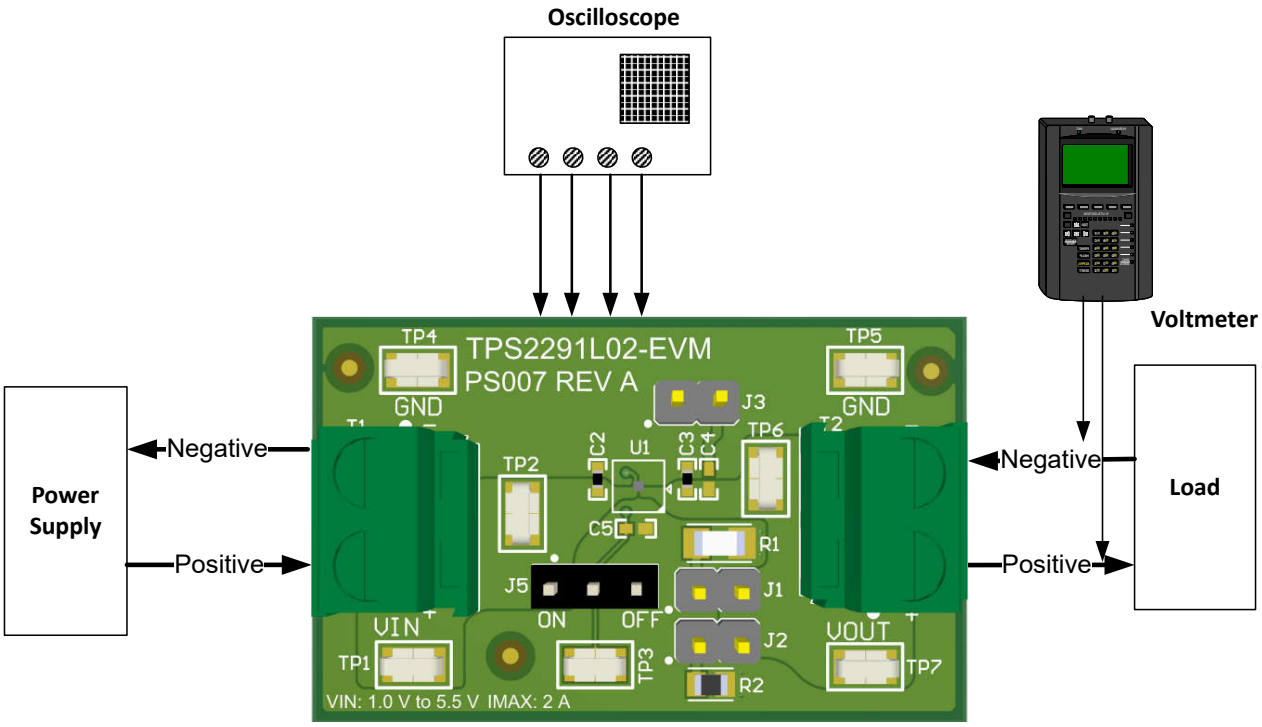


Figure 3-1. TPS2291L02-EVM Rise Time Test Setup

4 Hardware Design Files

4.1 Schematic

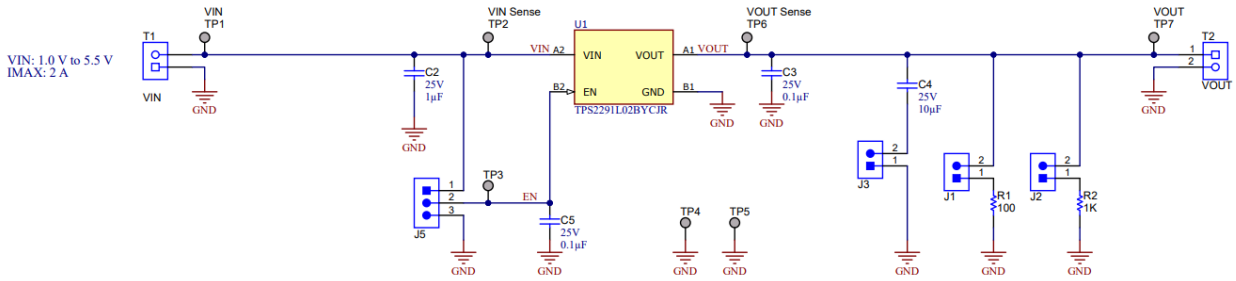


Figure 4-1. Schematic

4.2 PCB Layout

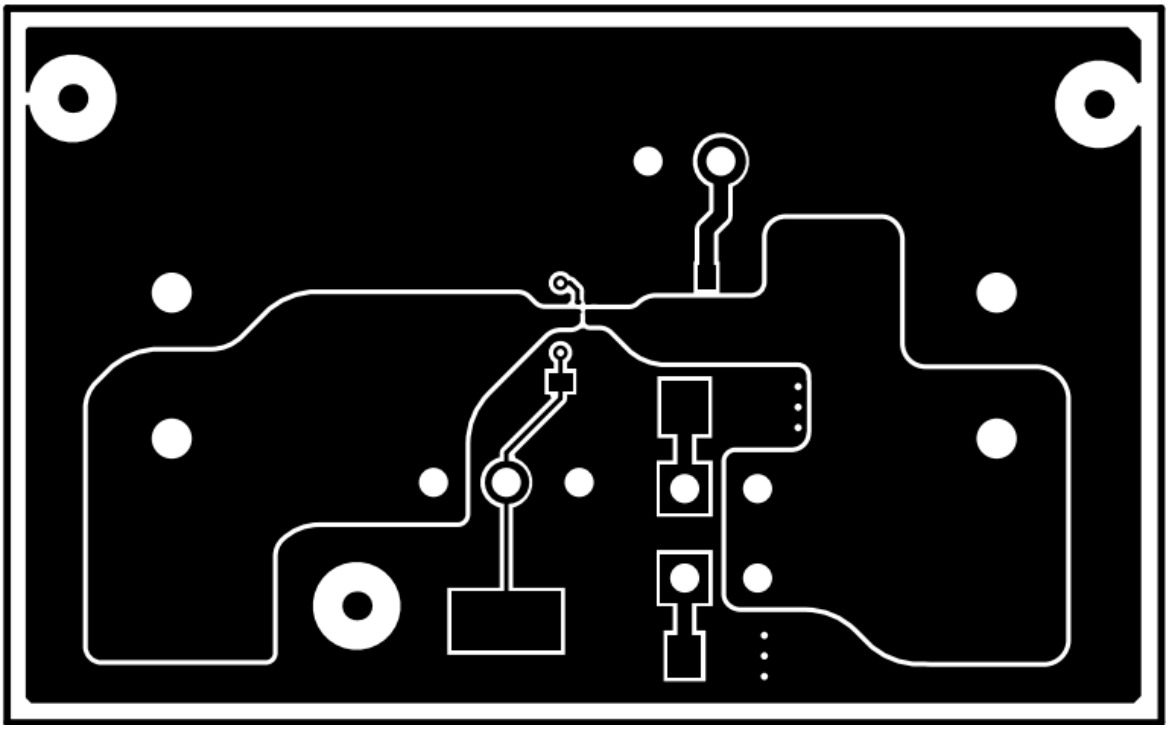


Figure 4-2. PCB Top Layer

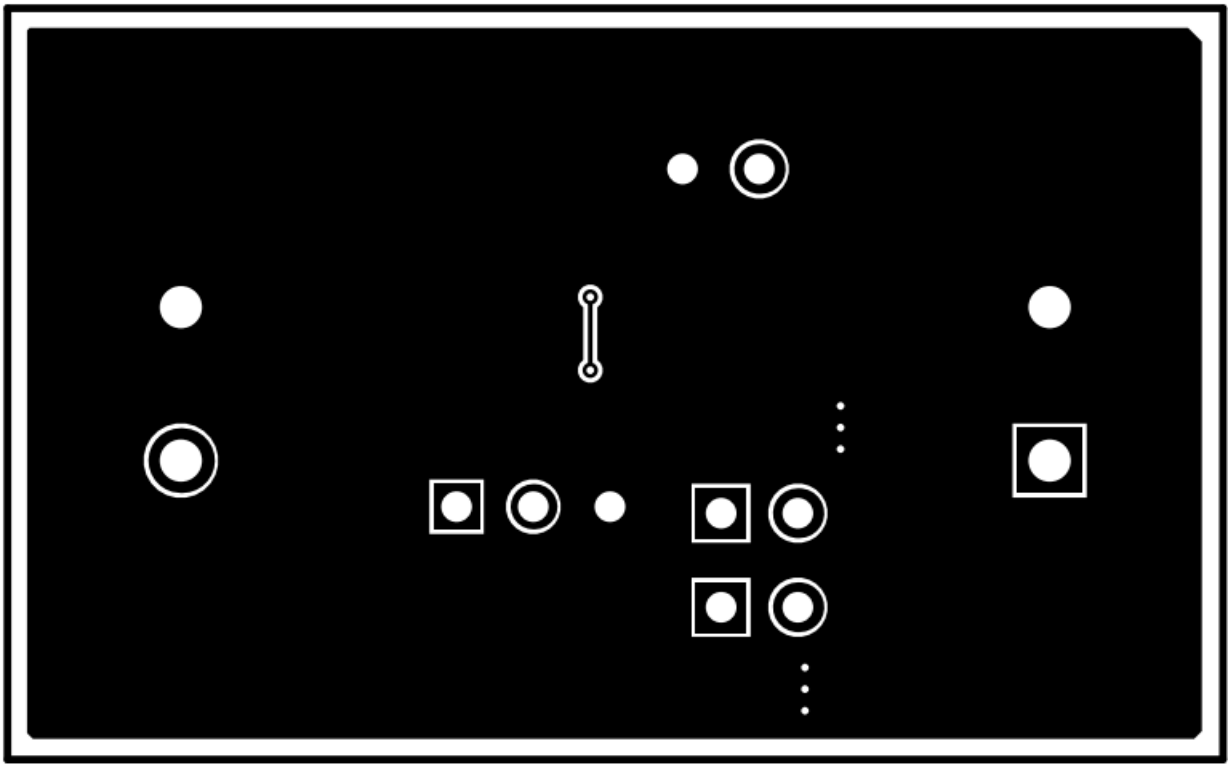


Figure 4-3. PCB Bottom Layer

4.3 Bill of Materials (BOM)

Table 4-1. Bill of Materials

Designator	Quantity	Value	Description	Package Reference	Part Number	Manufacturer
PCB	1		Printed Circuit Board		PS007	Any
C2	1	0.1uF	CAP, CER, 0.1µF, 25V, X7R, 0402	0402	CL05B104KA5NNNC	Samsung Electro-Mechanics
C3	1	1uF	CAP, CERM, 1µF, 25V, +/- 20%, X5R, 0402	0402	GRM155R61E105MA12D	MuRata
J1, J2, J3	3		Header, 100mil, 2×1, Gold, TH	Sullins_PBC02SAAN	PBC02SAAN	Sullins Connector Solutions
J5	1		Header, 100mil, 3×1, Tin, TH	CONN_PEC03SAAN	PEC03SAAN	Sullins Connector Solutions
R1	1	100	RES 100Ω 1% 1/2W 1206	1206	RNCP1206FTD100R	Stackpole Electronics Inc
R2	1	1k	RES SMD 1KΩ 1% 1/2W 0805	0805	CRCW08051K00FKEAHP	Vishay Dale
T1, T2	2		Terminal Block, 2×1, 5.08mm, TH	TEC_282841-2	282841-2	TE Connectivity
TP1, TP2, TP3, TP4, TP5, TP6, TP7	7		Test Point, Miniature, SMT	Keystone_5019	5019	Keystone
U1	1		TPS22991L02 5.5V, 2A, 22mΩ On-Resistance Ultra Low IQ Load Switch	YCJ0004A-MFG		Texas Instruments
C4, C5	2	0.1uF	CAP, CER, 0.1µF, 25V X7R, 0402	0402	CL05B104KA5NNNC	Samsung Electro-Mechanics
SH-J5	1	1×2	Shunt, 100mil, Flash Gold, Black	Closed Top 100mil Shunt	SPC02SYAN	Sullins Connector Solutions

5 Additional Information

5.1 Trademarks

All trademarks are the property of their respective owners.

6 Revision History

NOTE: Page numbers for previous revisions may differ from page numbers in the current version.

Changes from Revision * (October 2025) to Revision A (November 2025)	Page
• Updated GPN from TPS2291L02 to TPS2291L02-EVM	0

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NOTE:

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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.

FCC Interference Statement for Class B EVM devices

NOTE: 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.*

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

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

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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,
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Last updated 10/2025