

TXGx04x 4-Channel Ground-Level Translator Evaluation Module

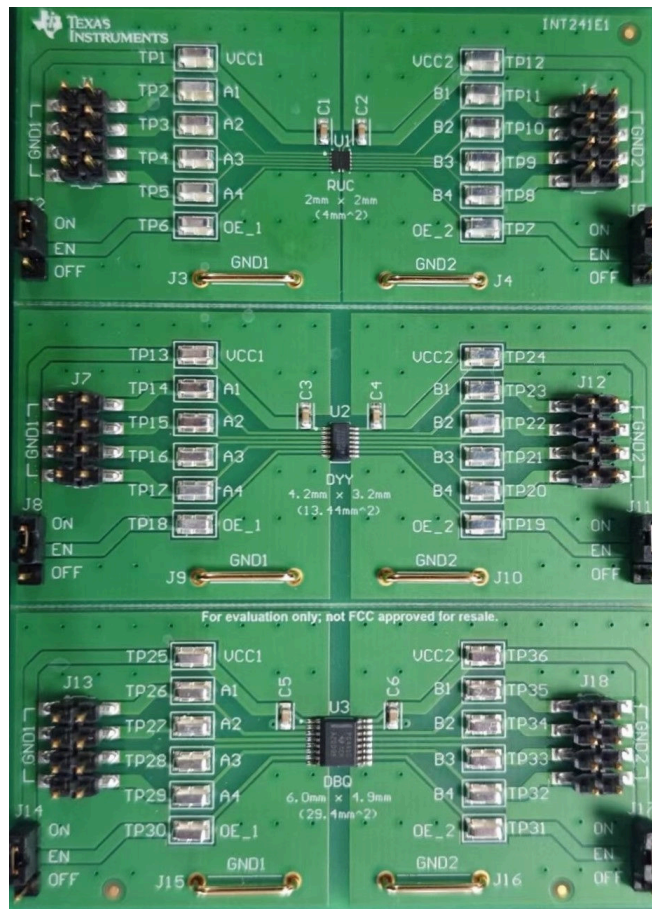


Description

TXG-4CH-EVM is an evaluation module (EVM) used to evaluate the TXGx04x 4-channel ground-level translator product family. The EVM supports multiple package options, which include 16-pin DBQ, 14-pin DYY, and 14-pin RUC. The EVM features multiple test points and connection options to evaluate the device.

Features

- 1.71V to 5.5V supply voltage
- GND shift tolerance up to $\pm 80V$
- Supports up to 250Mbps
- Power supply bypass capacitors
- Test points and connection pins



1 Evaluation Module Overview

1.1 Introduction

This user's guide describes evaluation module (EVM) operation for the TXGx04x four-channel ground-level translators. This guide also describes the EVM schematic and typical laboratory setup for evaluation as well as the typical input and output waveform.

1.2 Kit Contents

This evaluation module contains one PCB and three TXG4041 ICs with three package options. The major components of the TXG-4CH-EVM are:

- TXG ground-level translators
- On-board test points and connections for each device pin
- Power supply bypass capacitors

1.3 Specification

The TXGx04x is a 4-bit ground-level translator that uses two individually configurable power-supply rails which allows the TXGx04x to translate across two different power domains. The device is operational with V_{CCA} and V_{CCB} supplies as low as 1.71V and as high as 5.5V. The A port is designed to track V_{CCA} and the B port is designed to track V_{CCB} . In addition to I/O level shifting, these translators can support a difference up to $\pm 80V$ between GNDA and GNDB. V_{CCA} is referenced to GNDA and V_{CCB} is referenced to GNDB.

1.4 Device Information

The evaluation module contains three TXG4041 with various package options, a series of different connections and test points to help evaluate the device, and a small network of power supply bypass capacitors. All of the items are recommended for proper evaluation of the TXGx04x product family. If necessary, any of the EVM components can be removed, added, or replaced to modify the evaluation conditions of the device.

For a full list of components included in the TXG-4CH-EVM, please see [Table 3-1](#).

2 Hardware

2.1 Pin Configuration of TXGx04x products

Figure 2-1 shows the pin configuration of TXGx041 and TXGx042. This EVM gives the capability to sample any TXG 4-channel product regardless of package or configuration.

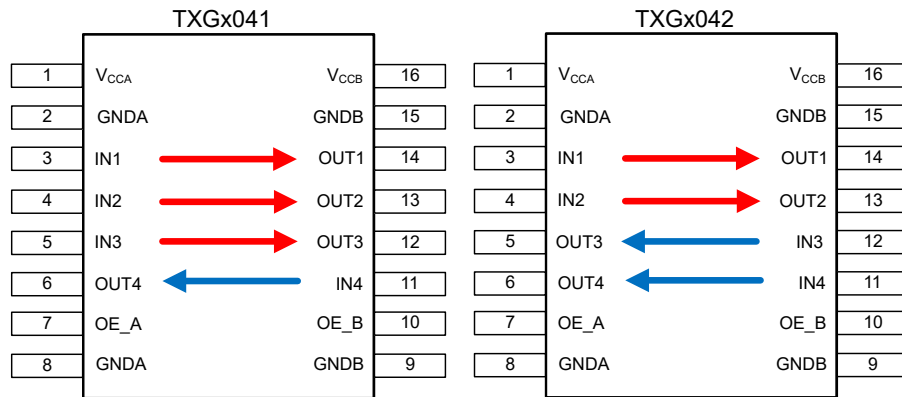


Figure 2-1. TXG-4CH-EVM Top Side

2.2 EVM Block Diagram and Image

Figure 2-2 shows the top view of the EVM PCB.

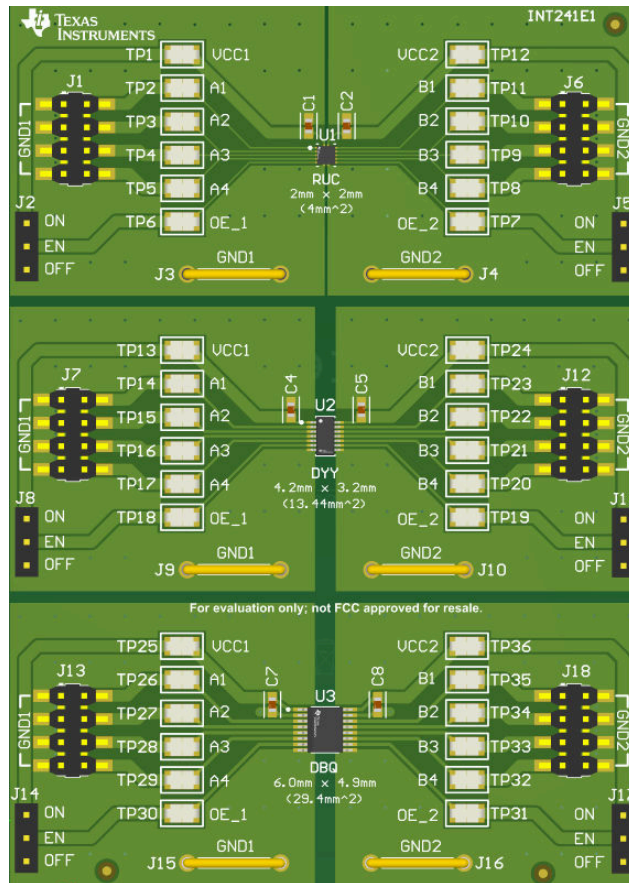


Figure 2-2. TXG-4CH-EVM 3D Diagram

2.3 EVM Setup and Operation

Section 2.3 describes the setup and operation of the EVM for parameter performance evaluation. Figure 2-3 shows the configuration for operating the TXG-4CH-EVM using two power supplies.

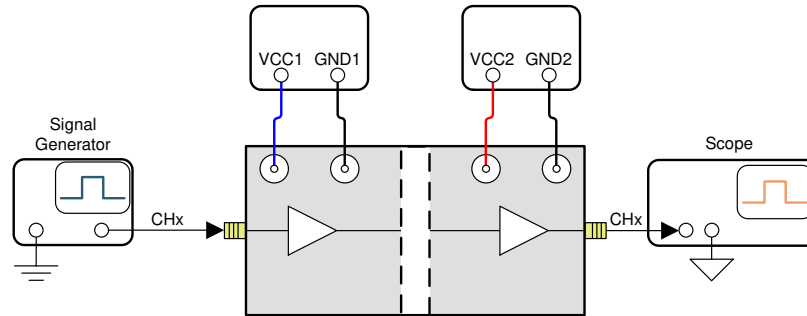


Figure 2-3. Basic EVM Operation

Figure 2-4 shows typical input and output waveforms of the EVM for a 1MHz clock. The input is shown as channel 2, and the output is shown as channel 3.

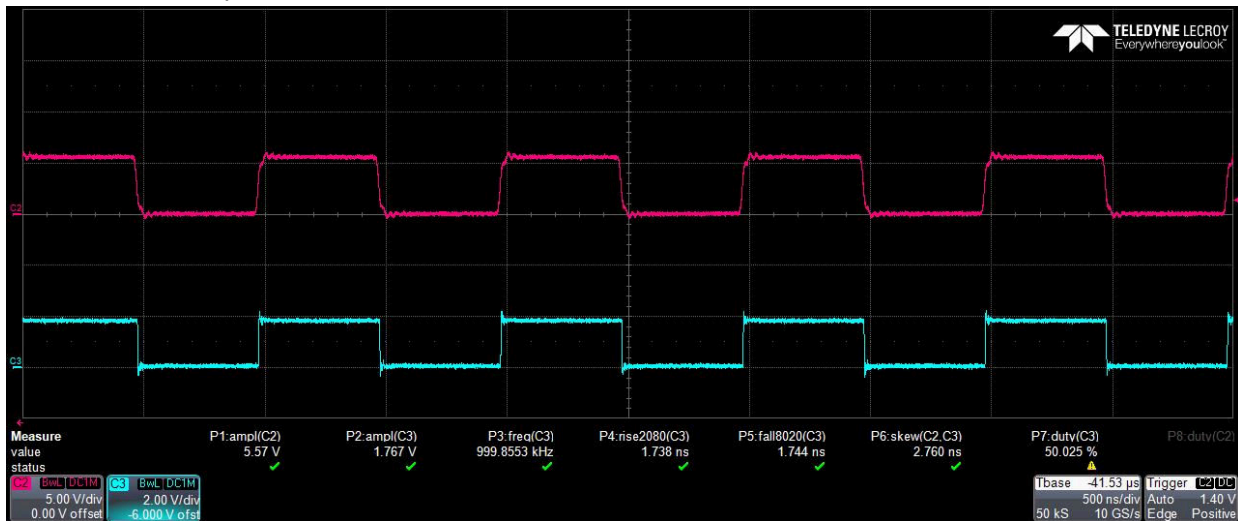


Figure 2-4. Typical Input and Output Waveform

3 Hardware Design Files

3.1 Schematic

Figure 3-1, Figure 3-2, and Figure 3-3 show the TXG-4CH-EVM schematic.

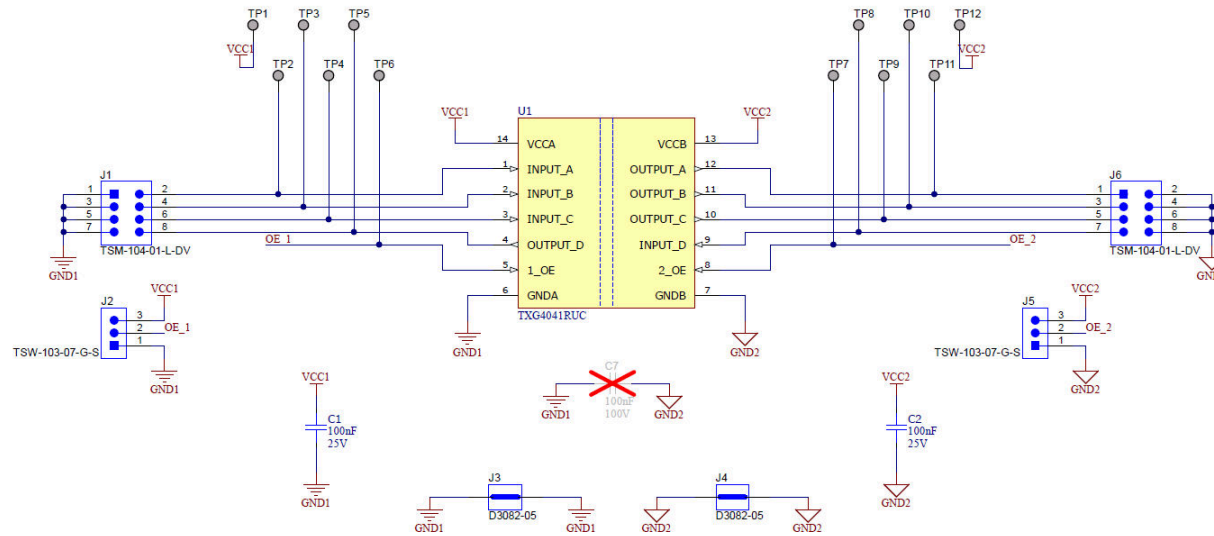


Figure 3-1. TXG-4CH-EVH (RUC) Schematic

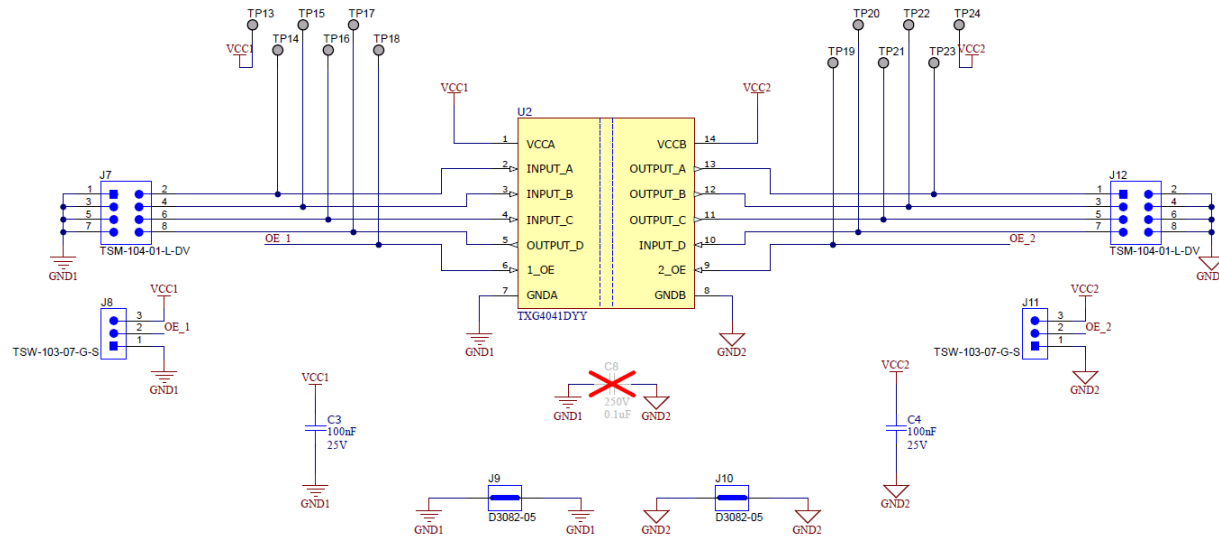


Figure 3-2. TXG-4CH-EVH (DYY) Schematic

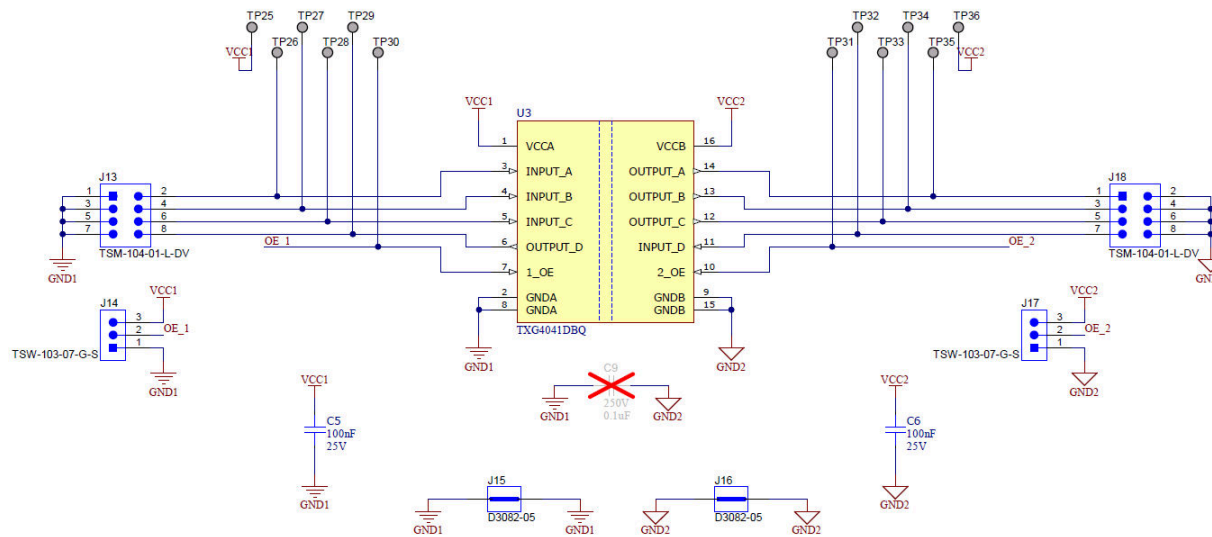


Figure 3-3. TXG-4CH-EVH (DBQ) Schematic

3.2 PCB Layouts

Figure 3-4 and Figure 3-6 show the top and bottom views of the PCB layout of the EVM. Figure 3-5 shows the top layer of the EVM.

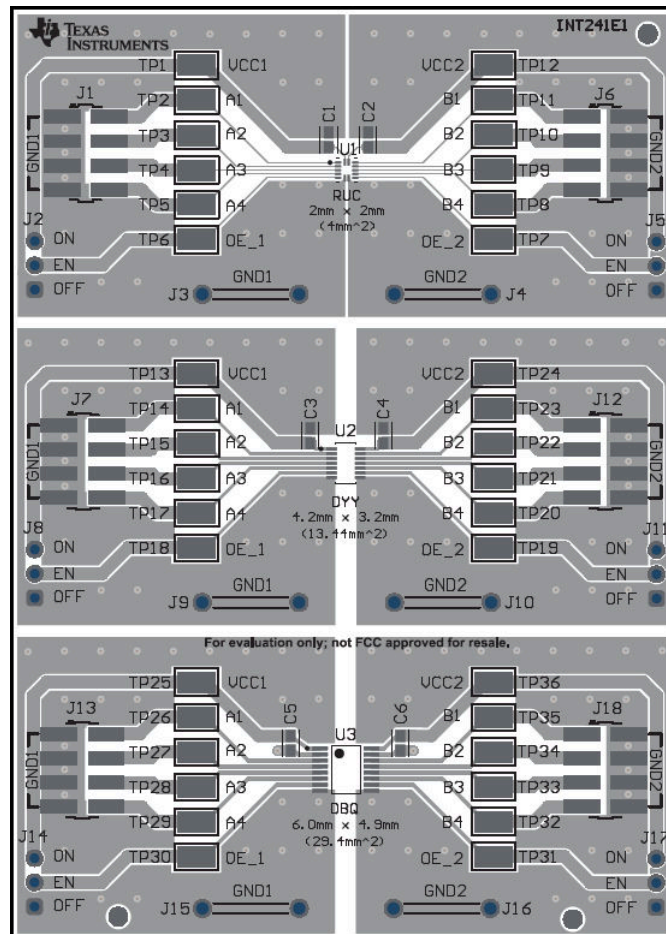


Figure 3-4. TXG-4CH-EVM - Composite Top View

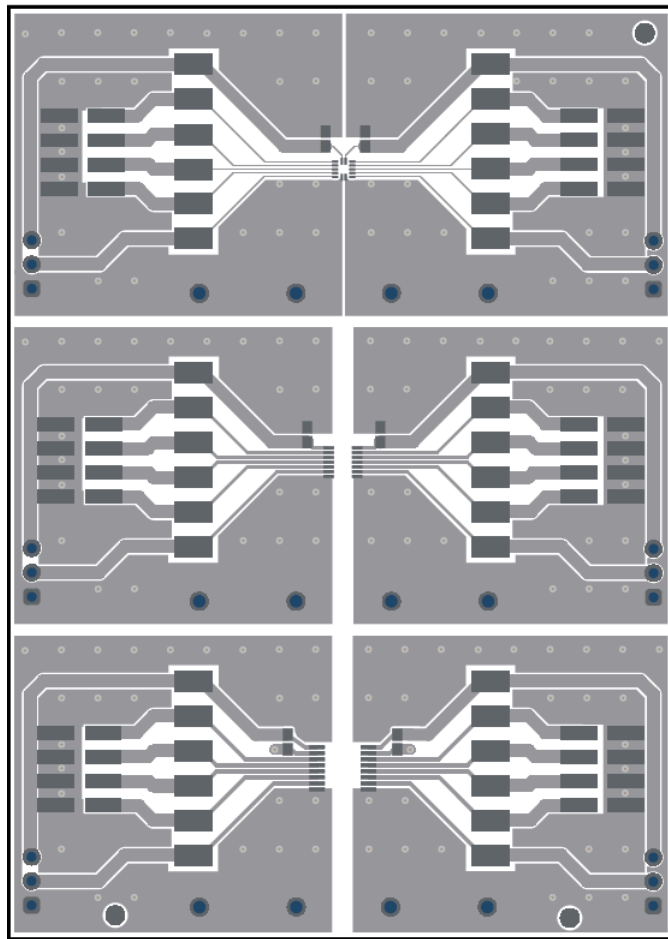


Figure 3-5. TXG-4CH-EVM - Top Layer

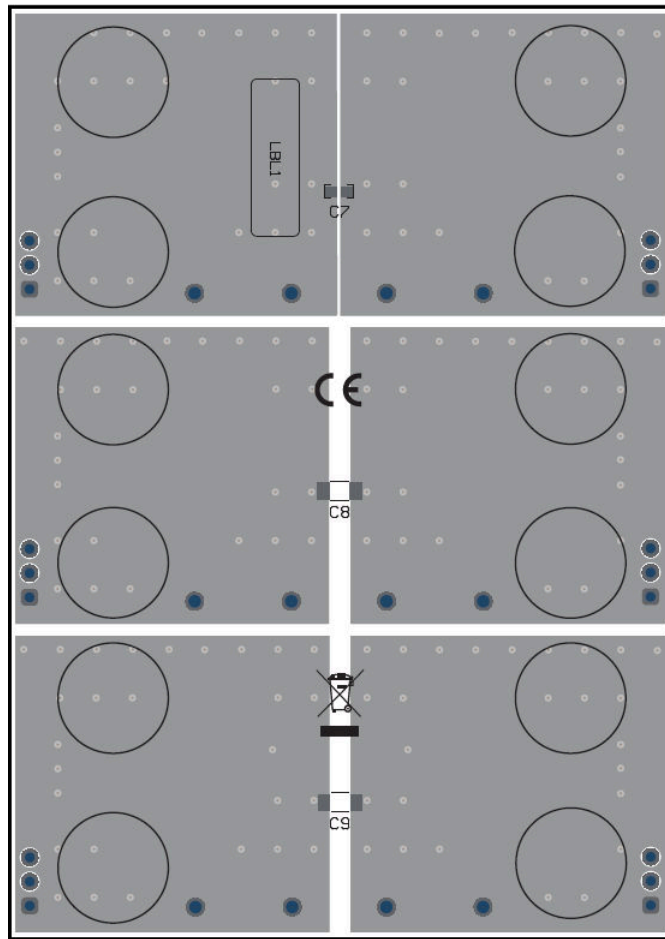


Figure 3-6. TXG-4CH-EVM - Composite Bottom View

3.3 Bill of Materials (BOM)

Table 3-1 shows the bill of materials (BOM) for this EVM.

Table 3-1. Bill of Materials

Designator	Quantity	Description	Manufacturer	Part Number
C1, C2, C3, C4, C5, C6	6	Cap Ceramic 0.1uF 25V X7R 10% SMD 0603 125°C	YAGEO	CC0603KRX7R8BB104
H1, H2, H3, H4, H5, H6, H7, H8, H9, H10, H11, H12	12	Bumpon, Hemisphere, 0.44 X 0.20, Clear	3M	SJ-5303 (CLEAR)
J1, J6, J7, J12, J13, J18	6	Header, 2.54mm, 4x2, Gold, SMT	Samtec	TSM-104-01-L-DV
J2, J5, J8, J11, J14, J17	6	Header, 100mil, 3x1, Gold, TH	Samtec	TSW-103-07-G-S
J3, J4, J9, J10, J15, J16	6	1mm Uninsulated Shorting Plug, 10.16mm spacing, TH	Harwin	D3082-05
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, TP36	36	Test Point, Miniature, SMT	Keystone	5019
U1	1	4-channel ground level translators, 3/1 configuration, RUC	Texas Instruments	TXG4041RUC
U2	1	4-bit ground level translators, 3/1 configuration, DYY	Texas Instruments	TXG4041DYY
U3	1	4-bit ground level translators, 3/1 configuration, DBQ	Texas Instruments	TXG4041DBQ
C7	0	CAP, CERM, 0.1uF, 100V, +/- 10%, X7R, 0603	MuRata	GRM188R72A104KA35D
C8, C9	0	CAP, CERM, 0.1uF, 250V, +/- 10%, X7R, 1206	MuRata	GRM31CR72E104KW03L

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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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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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This is a class A product intended for use in environments other than domestic environments that are connected to a low-voltage power-supply network that supplies buildings used for domestic purposes. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

-
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