



THE DATASHEET OF TLV40X1EVM



EVM User's Guide: TLV4021-41EVM

TLV40x1EVM Evaluation Module

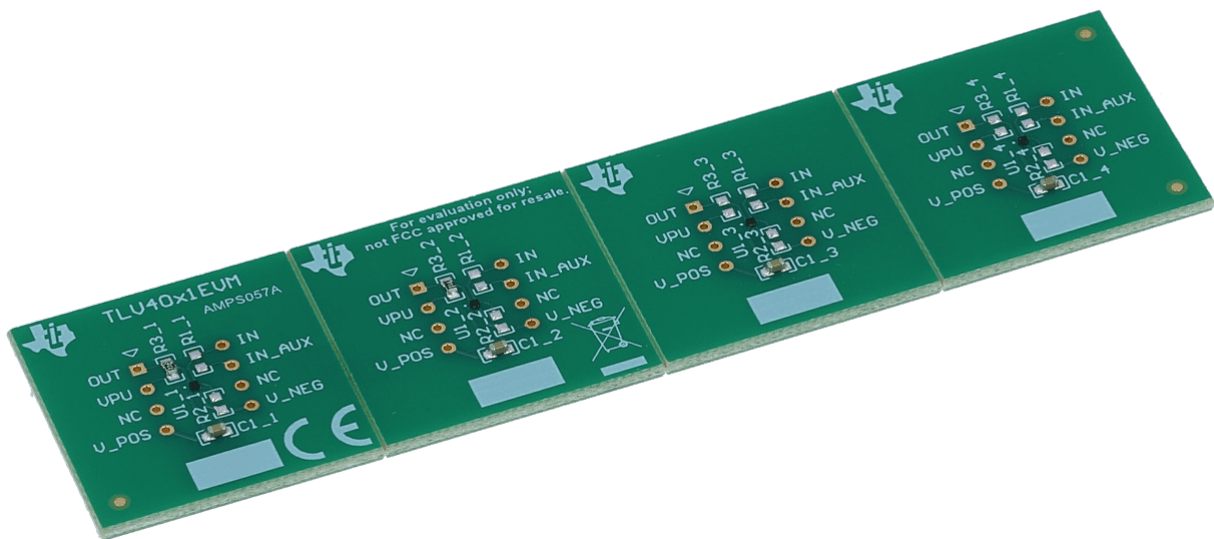


Description

The TLV40x1EVM evaluation module (EVM) demonstrates the performance of the TLV40x1 comparator family with integrated reference.

Features

- Precision integrated reference
- Provides 0.2V and 1.2V reference options
- Provides open-drain and push-pull output stage options



1 Evaluation Module Overview

1.1 Introduction

The TLV40x1 devices are MicroPower, high-accuracy comparators with an internal 0.2V or 1.2V reference and propagation delay of 450ns. The comparators are available in an ultra-small, WCSP package measuring 0.73mm × 0.73mm. The TLV40x1EVM is intended to easily evaluate or to integrate the device in the user's prototype system.

The EVM is comprised of four identical layouts (quadrants) where a different TLV40x1 device can be installed. For user flexibility, each quadrant can be conveniently detached from the other quadrants by flexing the EVM at the provided scribe lines. The shipped EVM has the TLV4021R1, TLV4031R1, TLV4041R2, and TLV4041R1 installed in quadrants (I to IV) respectively.

The EVM board provides mounting holes which are compatible to an industry standard DIP package. A 8-pin DIP socket, common 0.1 inch pin headers, or wires can be installed depending on the user's integration requirement.

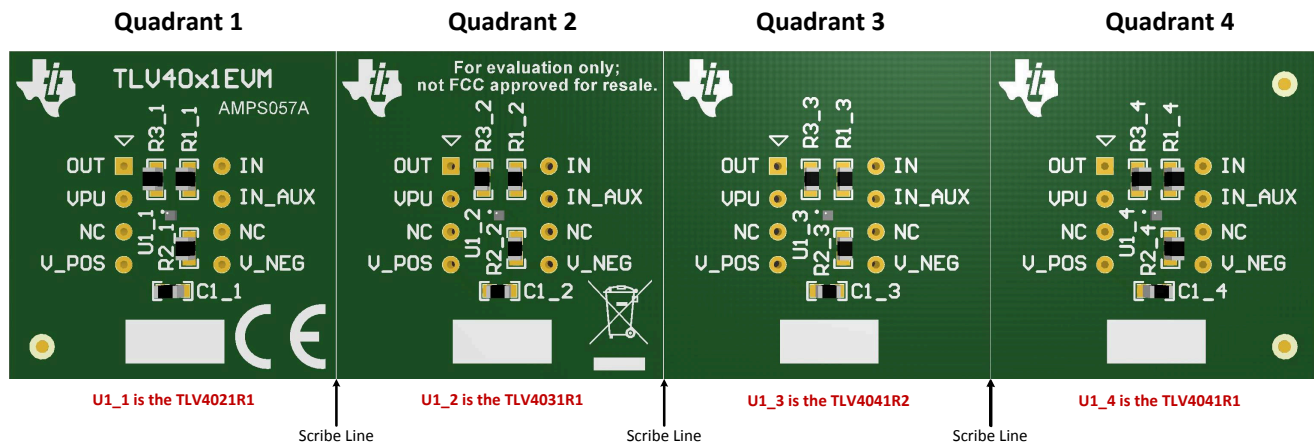


Figure 1-1. TLV40x1EVM Board (Top View)

1.2 Kit Contents

The kit comes with the following:

- (1) TLV4021-41EVM

1.3 Specification

The block diagram for each Quadrant is identical with each Quadrant having a different TLV40x1 device populated. For example, Quadrant 1 is populated with the TLV4021R1, Quadrant 2 is populated with the TLV4031R1, Quadrant 3 is populated with the TLV4041R2, and Quadrant 4 is populated with the TLV4041R1. See [Figure 1-2](#) for a description of each TLV40x1 family member.

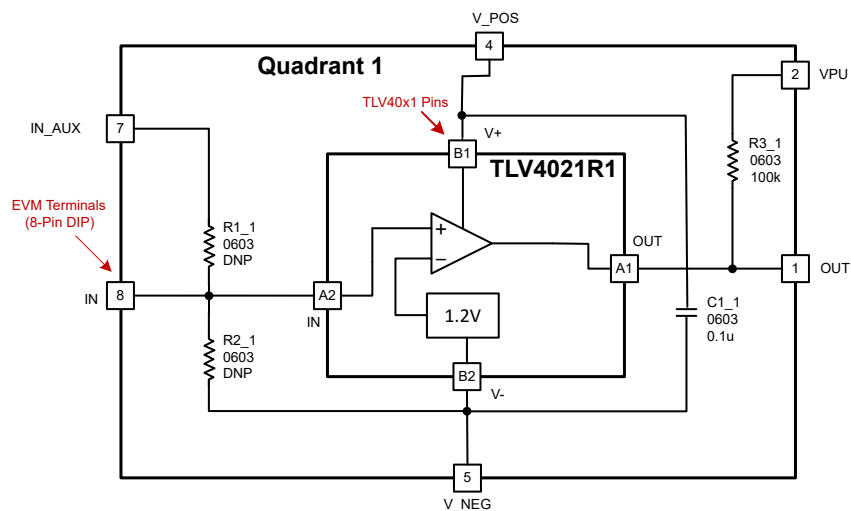


Figure 1-2. Block Diagram

1.4 Device Information

Table 1-1. TLV40x1 and EVM "Quadrant" Board Signals

TLV40x1 DEVICE		TLV40x1EVM DIP HOLES	
PIN NUMBER	SIGNAL NAME	PIN NUMBER	SIGNAL NAME
A1	OUT	1	OUT
B1	V+	4	V_POS
B2	V-	5	V_NEG
A2	IN	8	IN
		7	IN_AUX
		2	VPU
		3, 6	No Connection

Table 1-2. TLV40x1 Truth Table

DEVICE	REFERENCE VOLTAGE	INPUT CONFIGURATION	OUTPUT TOPOLOGY
TLV4021R2 TLV4021R1	0.2V 1.2V	Non-Inverting	Open-Drain
TLV4031R2 TLV4031R1	0.2V 1.2V	Inverting	Open-Drain
TLV4041R2 TLV4041R1	0.2V 1.2V	Non-Inverting	Push-Pull
TLV4051R2 TLV4051R1	0.2V 1.2V	Inverting	Push-Pull

2 Hardware

2.1 How to Use the TLV40x1EVM for Evaluation or System Prototypes

The TLV40x1EVM quadrant is assembled with the TLV40x1 device, a 0.1µF ceramic capacitor (in 0603 package), and a 100kΩ pull-up resistor (only for Quadrants I and II). If the application needs to scale down the input voltage to a lower value, a pair of resistors R1 and R2 can be installed by the user. In this case, connect the voltage to be monitored to IN_AUX (DIP PIN 7) instead of IN (DIP PIN 8).

Depending on the user's setup or requirement, a standard 8-pin DIP socket or 0.1-inch pin headers can be installed. Users can also solder wires directly to the DIP holes.

2.1.1 Usage Example

[Figure 2-1](#) shows a typical use case of TLV4021R1 as an undervoltage monitor. Resistors R1 and R2 need to be installed on the EVM and the voltage to be monitored is applied to IN_AUX (DIP PIN 7). The configuration detects an undervoltage condition when the input voltage at IN_AUX drops below 2V. The output pull-up resistor R3 is connected to a 1.8V supply through VPU (DIP PIN2). The example assumes that the logic device that is connected to the output of the comparator operates at 1.8V.

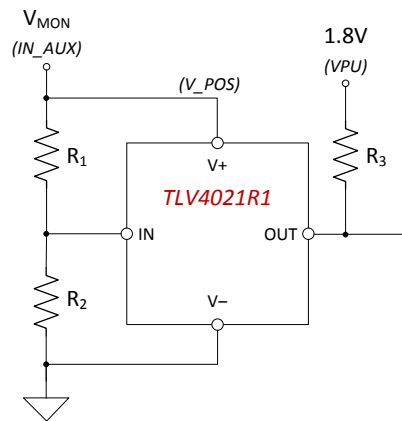


Figure 2-1. Usage Example

Listed below is the equation for deriving values for R1 and R2. For more details on this application, refer to the Applications section of the [TLV40x1 Small-Size, Low-Power Comparator with Precision Reference](#) data sheet.

$$R_1 = \frac{(V_{TH} - V_{IT-})}{V_{IT-}} \times R_2 \quad (1)$$

3 Hardware Design Files

3.1 TLV40x1EVM Schematic

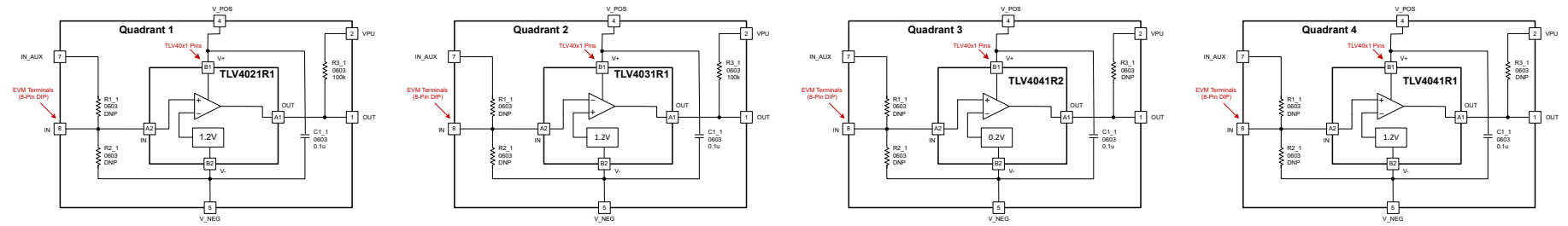


Figure 3-1. TLV40x1EVM Schematic

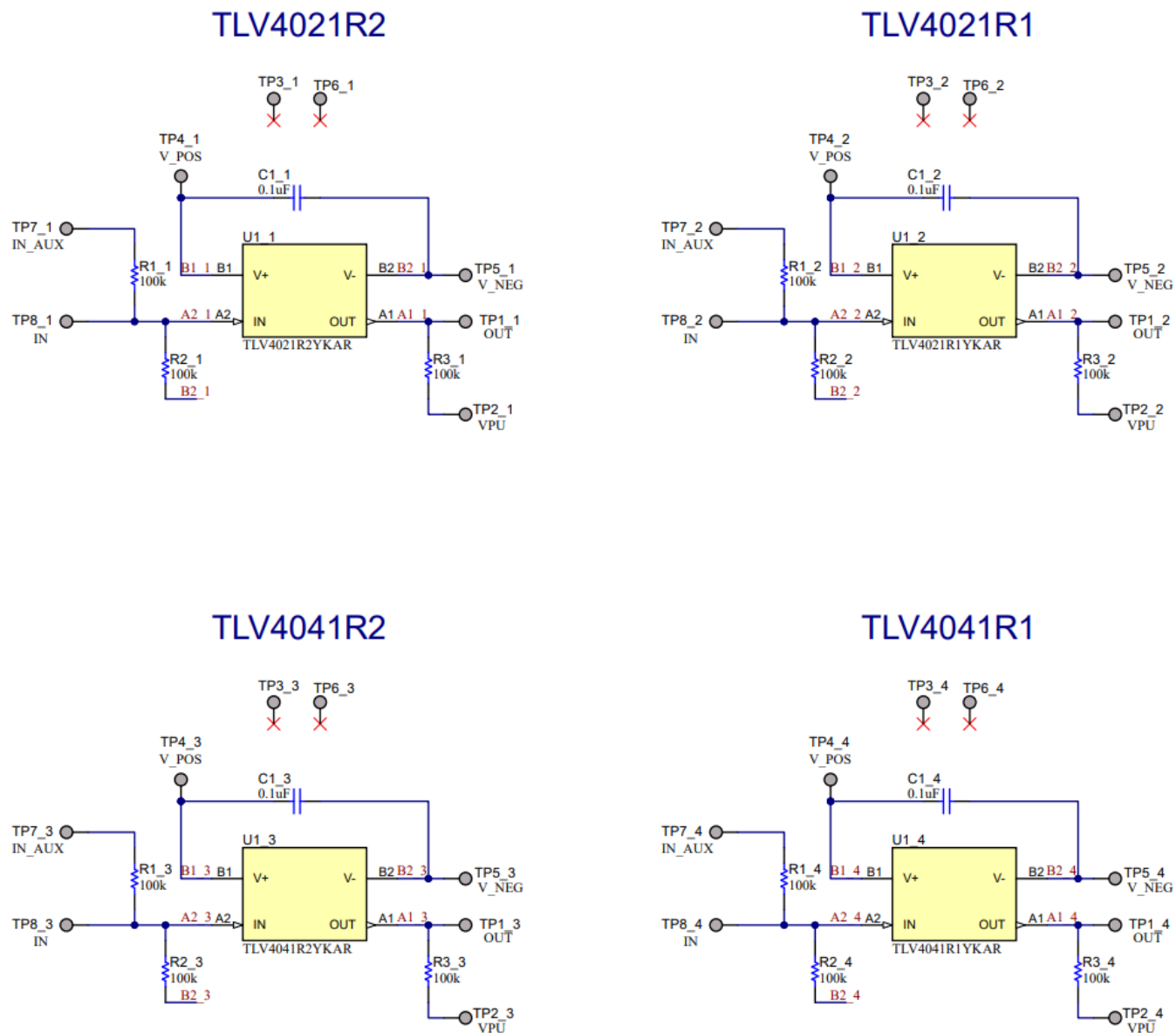
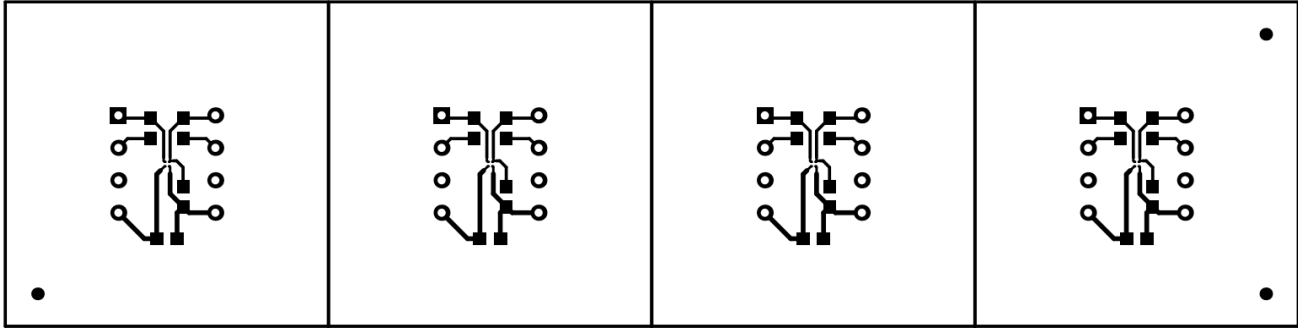
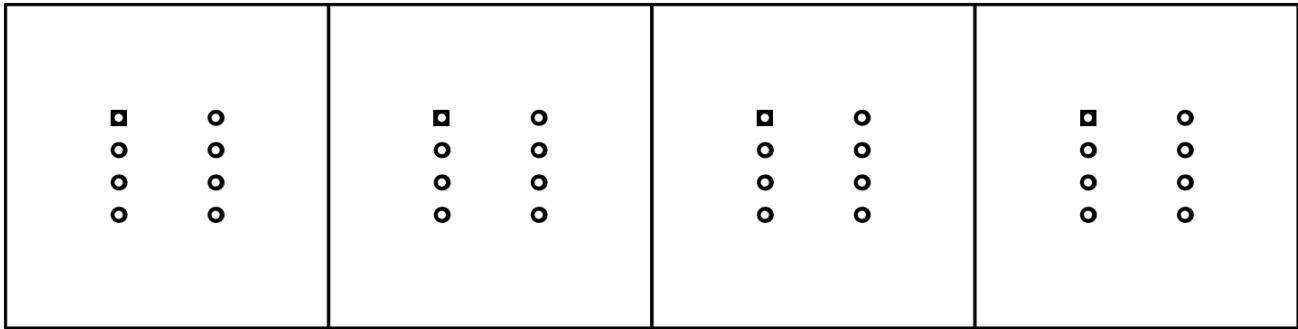


Figure 3-2. TLV40x1EVM Altium Schematic

3.2 PCB Layouts



Top Layer



Bottom Layer

Figure 3-3. TLV40x1EVM PCB Layouts

3.3 Bill of Materials (BOM)

Table 3-1. Bill of Materials

Designator	QTY	Value	Description	Package Reference	Part Number	Manufacturer
C1_1, C1_2, C1_3, C1_4	4	0.1uF	CAP, CERM, 0.1 uF, 10V, +/- 10%, X7R, 0603	0603	C0603X104K8RACTU	Kemet
R3_1, R3_2	2	100k	RES, 100 k, 5%, 0.1 W, AEC-Q200 Grade 0, 0603	0603	ERJ-3GEYJ104V	Panasonic
U1_1	1		TLV4021R1YKAR, YKA0004ADAD (DSBGA-4)	DSBGA-4	TLV4021R1YKAR	Texas Instruments
U1_2	1		TLV4031R1YKAR, YKA0004ADAD (DSBGA-4)	DSBGA-4	TLV4031R1YKAR	Texas Instruments
U1_3	1		TLV4041R2YKAR, YKA0004ADAD (DSBGA-4)	DSBGA-4	TLV4041R2YKAR	Texas Instruments
U1_4	1		TLV4041R1YKAR, YKA0004ADAD (DSBGA-4)	DSBGA-4	TLV4041R1YKAR	Texas Instruments
FID1, FID2, FID3	0		Fiducial mark. There is nothing to buy or mount.	N/A	N/A	N/A
R1_1, R1_2, R1_3, R1_4, R2_1, R2_2, R2_3, R2_4, R3_3, R3_4	0	100k	RES, 100 k, 5%, 0.1 W, AEC-Q200 Grade 0, 0603	0603	ERJ-3GEYJ104V	Panasonic

4 Additional Information

4.1 Trademarks

All trademarks are the property of their respective owners.

5 Revision History

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

Changes from Revision A (July 2019) to Revision B (June 2024)	Page
• Changed <i>Block Diagram</i> to reflect the TLV4021R1 integrated reference of 1.2V.....	2
• Changed schematics to show the input of the TLV4031R1 is connected to the inverting input.....	5

Changes from Revision * (September 2019) to Revision A (July 2019)	Page
• Changed the BOM for the EVM. All 4 Quadrants are now populated with different devices from the TLV40x1 family.....	2

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Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

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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.

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(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.

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