

TLC69625-Q1, 24-Channel Current Sink LED Driver Evaluation Module



Description

The TLC69625Q1 evaluation module (EVM) is used to evaluate the characteristics, operation, and usage for local dimming LED driver TLC69625-Q1. The TLC69625-Q1 a LED driver with 24 constant current sink channels that could provide up to 16-bit individual pixel-level LED PWM control. Each device shares data stream by cascaded serial peripheral interface (SPI) that supports up to 511 devices connection.

Get Started

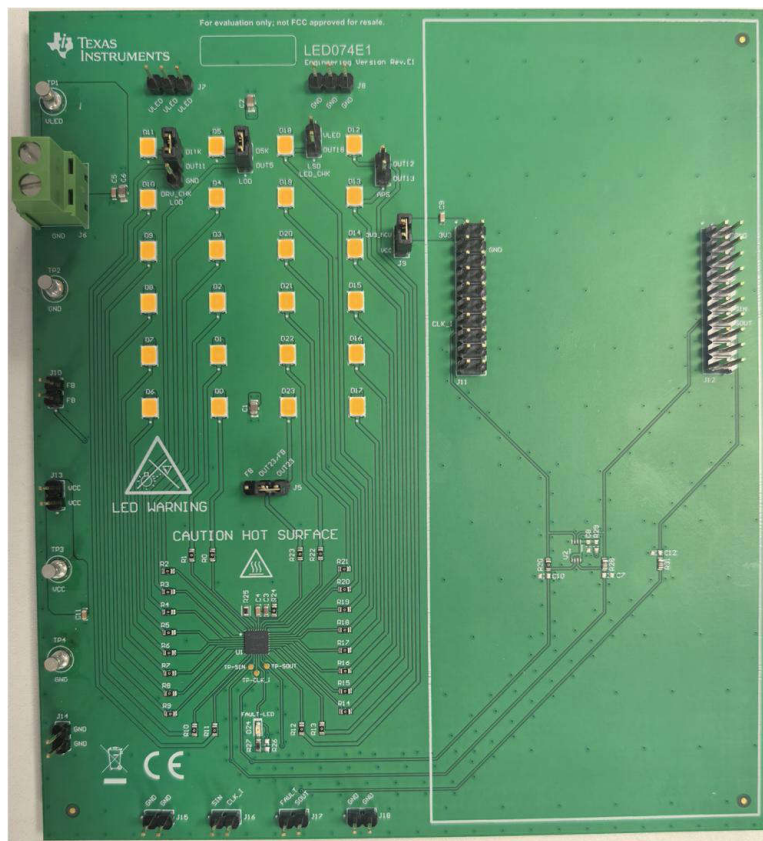
1. Order the EVM...
2. Download the latest libraries. [TLC69625Q1EVM](#)
3. Download the comprehensive reference design files.
4. See the latest [TLC69625Q1EVM](#)

Features

- Programmable 16-bit PWM / Hybrid dimming
- Programmable 7-bit analog dot correction (DC)
- Phase shifting and spread spectrum
- Adaptive headroom voltage control (AHVC) for high system efficiency
- LED open / short detection, device under voltage detection, ISET out of range detection, thermal shutdown

Applications

- LCD local dimming backlight:
 - [Automotive central information display](#)
 - [Automotive cluster display](#)
 - [Automotive head-up display](#)



1 Evaluation Module Overview

1.1 Introduction

The TLC69625-Q1 is a LED driver with 24 constant current sink channels which provides up to 16-bit individual pixel-level LED PWM control. The additional 7-bit dot correction (DC) is also implemented to each channel to control peak current. Each device shares data stream by serial peripheral interface (SPI) which supports up to 511 devices connection.

The user's guide describes the characteristics, setup, and usage of the TLC69625-Q1 evaluation module (EVM) as a reference for engineering demonstration. The TLC69625Q1EVM helps the user evaluate the features of the Texas Instruments TLC69625-Q1. The user's guide includes hardware and software setup instructions, printed-circuit board (PCB) layout drawings, a schematic diagram, and a bill of materials.

The document contains following contents:

- How to set up the TLC69625Q1EVM hardware and software
- How to use the LAUNCHXL-F280039C to light up the LEDs
- Design resource for the TLC69625Q1EVM

1.2 Kit Contents

- One TLC69625Q1EVM board

Note

This EVM requires a controller (for example, the MCU), which is not included.

Contact the TI Product Information Center at (972) 644-5580 if any component is missing. Download the latest versions of the related software on the TI website, www.ti.com.

1.3 Specification

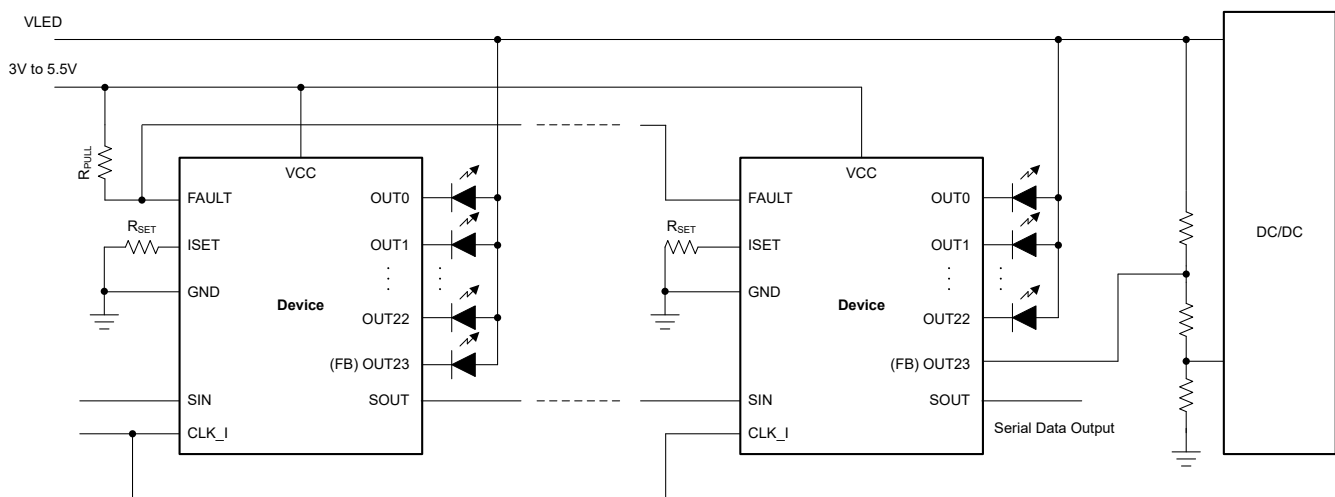


Figure 1-1. Typical Application Schematic

1.4 Device Information

The documents in [Table 1-1](#) provide information regarding Texas Instruments integrated circuits used in the assembly of the TLC69625Q1EVM. This user's guide is available from the TI web site under literature number SLVUDR0. Any letter appended to the literature number corresponds to the document revision that is current at the time of the writing of this document. Newer revisions are available from the TI web site at www.ti.com.

Table 1-1. Related Device Documentation

Document	Literature Number
TLC69625-Q1 product data sheet	SNVSCX4
SN74LVC2T45 product data sheet	SCES516

2 Hardware

2.1 Hardware Equipment

The following sections describe how to set up the TLC69625Q1EVM properly. Items from the following list are required to begin evaluating the TLC69625Q1EVM:

Hardware:

- Computer
- TLC69625Q1EVM
- External power supplies
- USB Type-A plug to USB Type-C® plug cable
- LAUNCHXL-F280039C

Software:

- Code Composer Studio™ integrated development environment (IDE)

Figure 2-1 shows the default hardware setups on TLC69628Q1EVM board. The jumper J1 is for LED short test which remains unconnected by default and J3 is for LED open test which remains connected by default. The jumper J2 is for current sink health check which is channel short to GND test and OUT11 is connected to D11K by default. The jumper J4 is for adjacent-pin short test which remains unconnected by default. Figure 2-2 shows the image of the LAUNCHXL-F280039C.

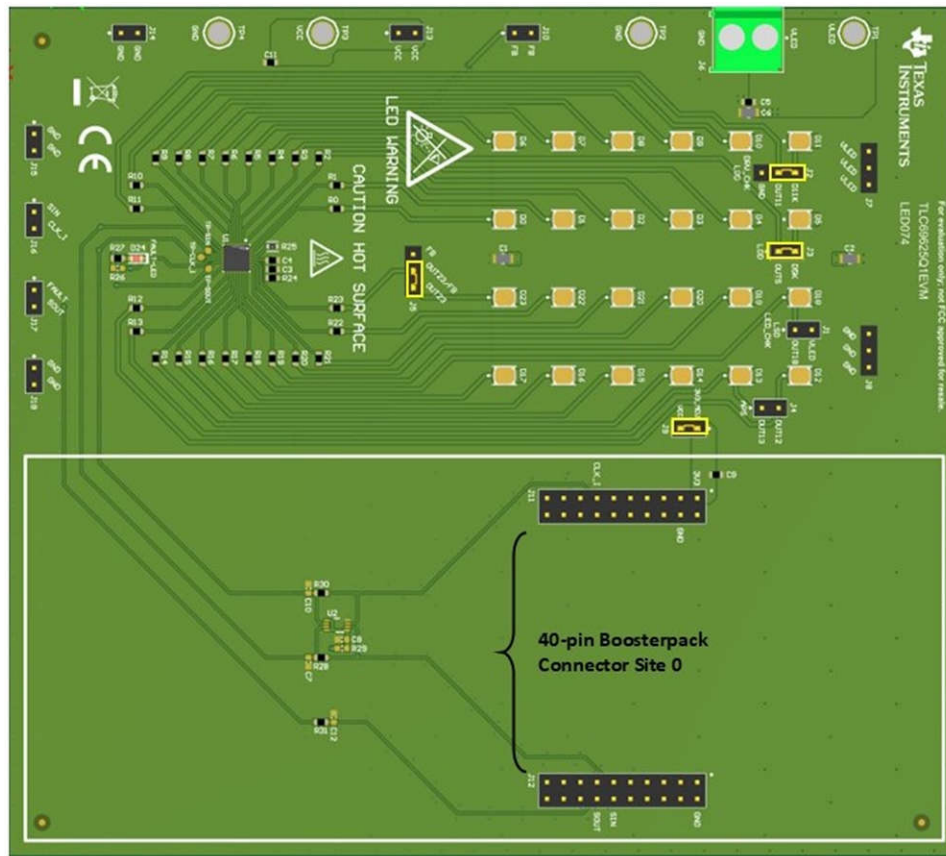


Figure 2-1. TLC69625Q1EVM Board

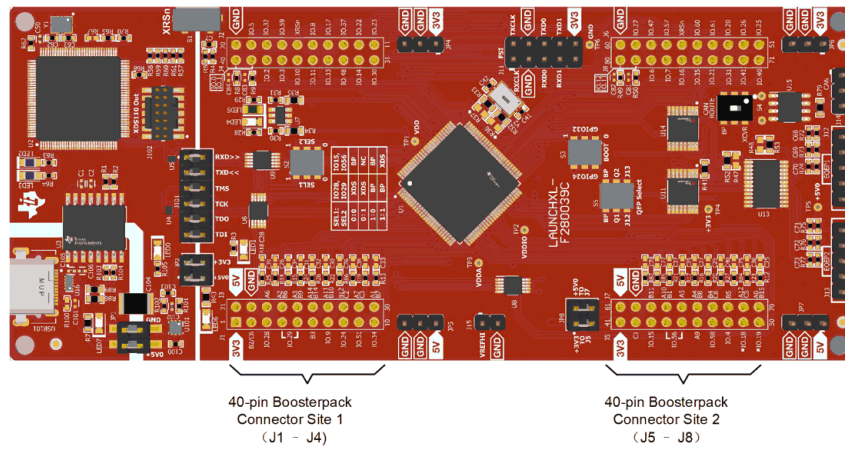


Figure 2-2. LAUNCHXL-F280039C

2.2 Hardware Setup

To achieve high brightness, the board is evaluated by external power supply in the default jumper setting. Setup connection is demonstrated in [Figure 2-3](#). The setup procedure is as follows:

1. Connect TLC69625Q1EVM 40-pin boosterpack connectors site 0 with LAUNCHXL-F280039C 40-pin boosterpack connector site 1.
2. Connect the computer with LAUNCHXL-F280039C using USB Type-A plug to USB Type-C plug cable.
3. Connect VLED/GND on the TLC69625Q1EVM to 4.0V/GND Power Supply, and set current limit to 5A.
4. Connect VCC/GND on the TLC69625Q1EVM to 3.3V/GND Power Supply, and set current limit to 0.1A.
5. Power on 4.0V/GND and 3.3V/GND power supply.

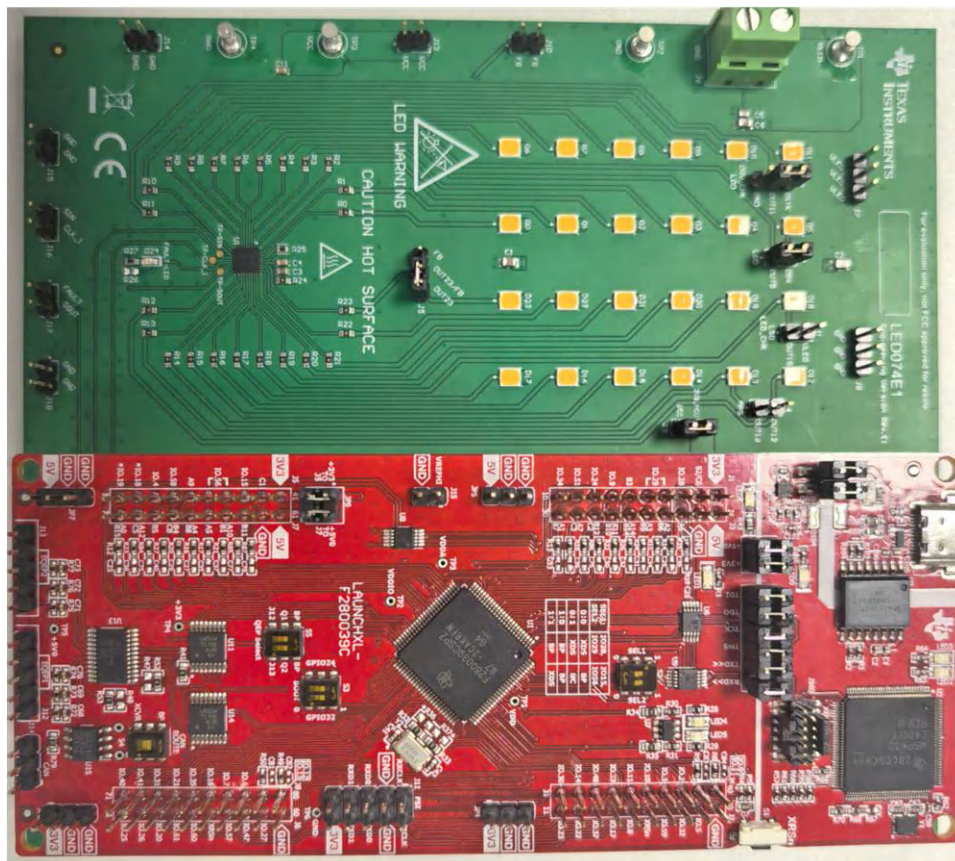


Figure 2-3. TLC69625Q1EVM Connect with LAUNCHXL-F280039C

3 Software

3.1 Software Setup

To set up the software for the TMS320F280039C LaunchPad™, follow the steps documented in the sample code user's guide, which can be downloaded from [TLC6962x_TLC6963x_Sample Code User's Guide](#). This user's guide also provides guidance on software setup for LED driver diagnostics, multiple CSI buses, cascading devices, and animation control.

4 Hardware Design Files

4.1 Schematic

Figure 4-1 shows the EVM schematic.

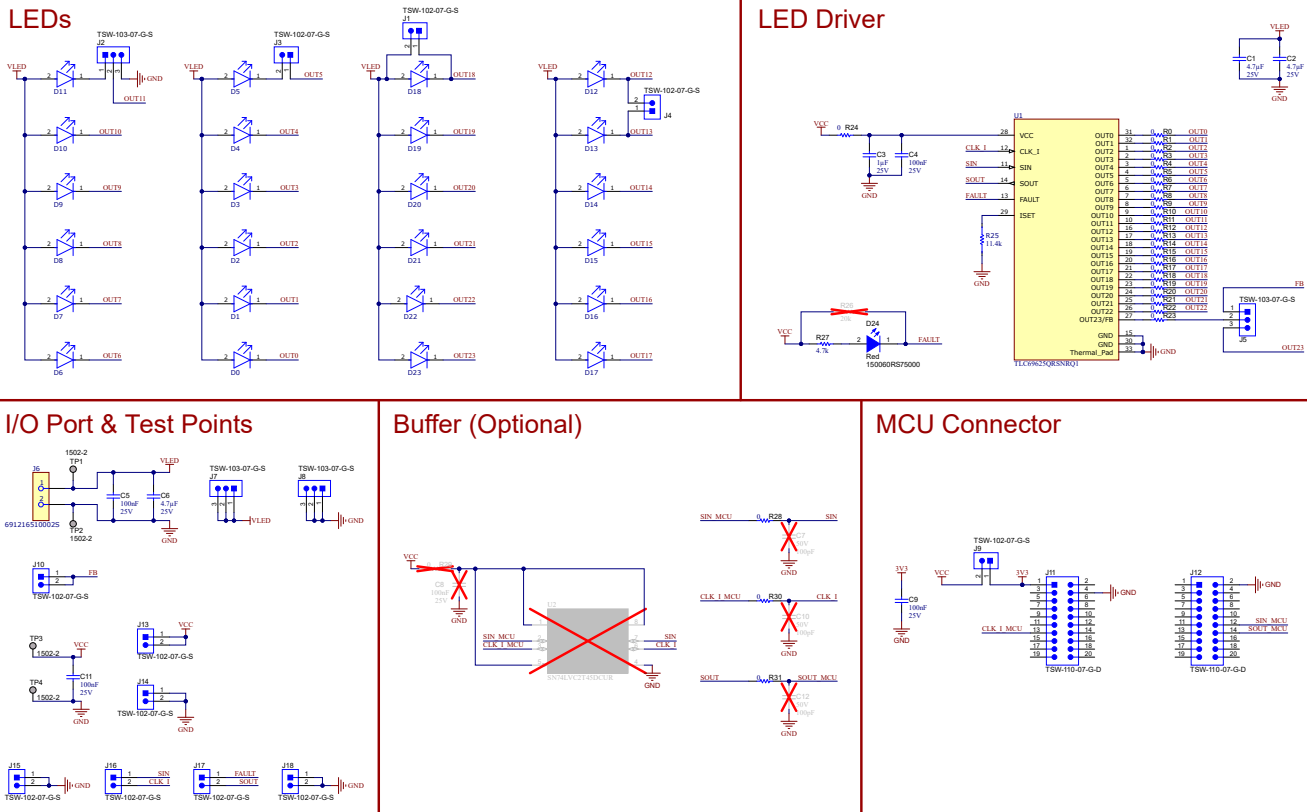


Figure 4-1. TLC69625Q1EVM - Schematic

4.2 PCB Layout

Figure 4-2 and Figure 4-3 show the EVM board layout.

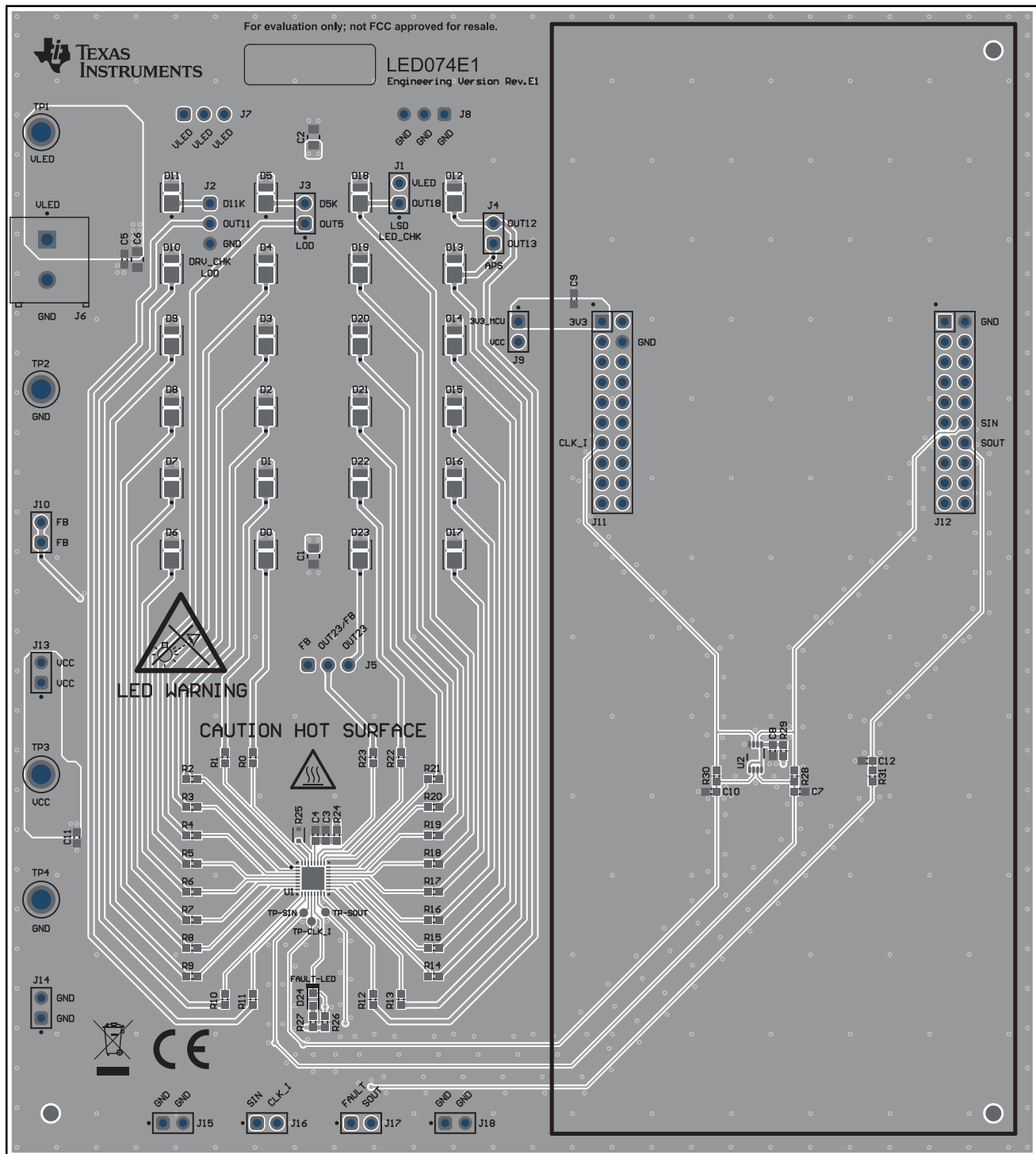


Figure 4-2. TLC69625Q1EVM Layout-Top

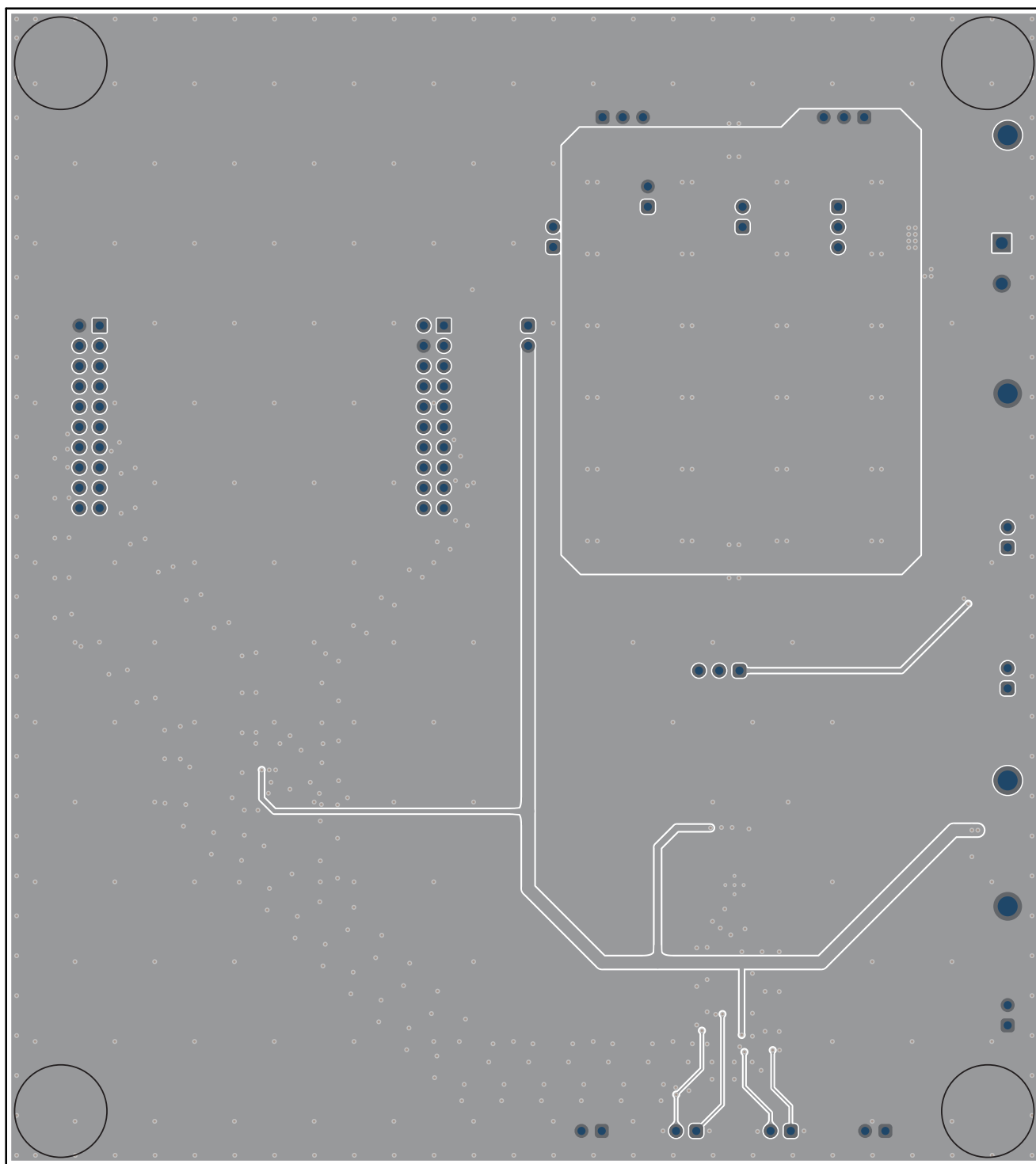


Figure 4-3. TLC69625Q1EVM Layout-Bottom

4.3 Bill of Materials

Table 4-1 lists the bill of materials for TLC69625Q1EVM.

Table 4-1. Bill of Materials

Designator	Qty	Description	Manufacturer	Part Number
C1, C2, C6	3	CAP, CERM, 4.7uF, 25V, +/- 10%, X7R, 0805	TDK	CGA4J1X7R1E475K125AC
C3	1	CAP, CERM, 1uF, 25V, +/- 10%, X7R, 0603	TDK	CGA3E1X7R1E105K080AC
C4, C5, C9, C11	4	CAP, CERM, 0.1uF, 25V, +/- 10%, X7R, 0603	TDK	CGA3E2X7R1E104K080AA
D0-D23	24	LED Lighting LUXEON 2835 Architectural White, Warm 2700K 3V 120mA 120° 1411 (3528 Metric)	Lumileds	L128-2780CA3500001
D24	1	LED, Red, SMD	Würth Elektronik	150060RS75000
H1-H4	4	Bumpon, Hemisphere, 0.44 X 0.20, Clear	3M	SJ-5303 (CLEAR)
J1, J3, J4, J9, J10, J13-J18	11	Header, 2.54mm, 2x1, Gold, TH	Samtec	TSW-102-07-G-S
J2, J5, J7, J8	4	Header, 2.54mm, 3x1, Gold, TH	Samtec	TSW-103-07-G-S
J6	1	2 Position Wire to Board Terminal Block Horizontal with Board 0.200" (5.08mm) Through Hole	Würth Electronics	691216510002S
J11, J12	2	Header, 2.54mm, 10x2, Gold, TH	Samtec	TSW-110-07-G-D
R0-R24, R28, R30, R31	28	RES, 0, 5%, 0.1 W, AEC-Q200 Grade 0, 0603	Vishay-Dale	CRCW06030000Z0EA
R25	1	RES, 11.4k, ±0.1%, 0.1W, 0603 (1608 Metric) Moisture Resistant Thin Film	KOA Speer	RN73R1JTTD1142B25
R27	1	RES, 4.7k, 5%, 0.1W, AEC-Q200 Grade 0, 0603	Vishay-Dale	CRCW06034K70JNEA
SH-J1, SH-J2, SH-J3, SH-J4	4	Shunt, 100mil, Gold plated, Black	Samtec	SNT-100-BK-G
TP1, TP2, TP3, TP4	4	Terminal, Turret, TH, Double	Keystone	1502-2
U1	1	Automotive 60mA, 24-Channel LED Driver With Integrated Oscillator, TSOT16	Texas Instruments	TLC69625QRSNRQ1

5 Additional Information

5.1 Trademarks

Code Composer Studio™ is a trademark of Texas Instruments.

LaunchPad™ is a trademark of Texas Instruments.

USB Type-C® is a registered trademark of USB Implementers Forum.

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6 Revision History

DATE	REVISION	NOTES
May 2026	*	Initial Release

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Evaluation Kits 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 shall operate the Evaluation Kit within TI's recommended guidelines and any applicable legal or environmental requirements as well as reasonable and customary safeguards. Failure to set up and/or operate the Evaluation Kit within TI's recommended guidelines may result in personal injury or death or property damage. Proper set up entails following TI's instructions for electrical ratings of interface circuits such as input, output and electrical loads.

NOTE:

EXPOSURE TO ELECTROSTATIC DISCHARGE (ESD) MAY CAUSE DEGRADATION OR FAILURE OF THE EVALUATION KIT; TI RECOMMENDS STORAGE OF THE EVALUATION KIT IN A PROTECTIVE ESD BAG.

3 Regulatory Notices:

3.1 United States

3.1.1 Notice applicable to EVMs not FCC-Approved:

FCC NOTICE: This kit is designed to allow product developers to evaluate electronic components, circuitry, or software associated with the kit to determine whether to incorporate such items in a finished product and software developers to write software applications for use with the end product. This kit is not a finished product and when assembled may not be resold or otherwise marketed unless all required FCC equipment authorizations are first obtained. Operation is subject to the condition that this product not cause harmful interference to licensed radio stations and that this product accept harmful interference. Unless the assembled kit is designed to operate under part 15, part 18 or part 95 of this chapter, the operator of the kit must operate under the authority of an FCC license holder or must secure an experimental authorization under part 5 of this chapter.

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.

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 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。

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

3.3.2 *Notice for Users of EVMs Considered "Radio Frequency Products" in Japan:* EVMs entering Japan may not be certified by TI as conforming to Technical Regulations of Radio Law of Japan.

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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3.4.1 *For EVMs subject to EU Directive 2014/30/EU (Electromagnetic Compatibility Directive):*

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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 - 4.1 EVMS ARE NOT FOR USE IN FUNCTIONAL SAFETY AND/OR SAFETY CRITICAL EVALUATIONS, INCLUDING BUT NOT LIMITED TO EVALUATIONS OF LIFE SUPPORT APPLICATIONS.
 - 4.2 User must read and apply the user guide and other available documentation provided by TI regarding the EVM prior to handling or using the EVM, including without limitation any warning or restriction notices. The notices contain important safety information related to, for example, temperatures and voltages.
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