

TLV61040QEVM-166 Evaluation Module

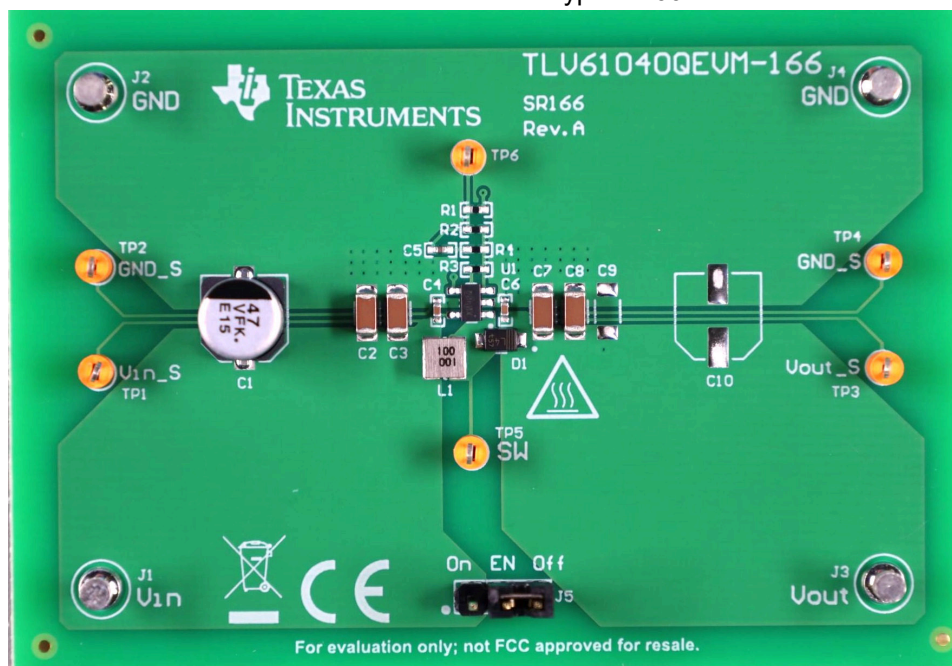


Description

The TLV61040-Q1 is a non-synchronous boost converter, which has a wide input voltage range of 1.8V to 20V. The output voltage covers up to 28V with a 400mA peak switching current capability. This EVM is designed for 2V to 14V input voltage and 18V output voltage applications.

Features

- Output current 20mA ($V_{IN} \geq 5V$ to $V_{OUT} = 18V$)
- Up to 90% efficiency at $V_{IN} = 5V$ to $V_{OUT} = 18V$, and $I_{OUT} = 20mA$
- Typical 400mA fixed peak switching current limit
- Typical 25 μ A quiescent current
- Off-time modulation operation mode
- Typical 400ns minimum off-time



TLV61040QEVM-166

1 Evaluation Module Overview

1.1 Introduction

This user's guide describes the setup, schematic, and layout of the evaluation module (EVM) for the TLV61040-Q1. The EVM helps to evaluate the behavior and performance of the device at different input voltages, output voltages, and load conditions.

This EVM is designed for 2V to 14V input voltage and 18V output voltage applications. The EN jumper (J5) controls the ON and OFF of the device. This EVM has test points of TP5 and TP6 for SW voltage and loop measurement, respectively. The feedback divider can be modified for other application conditions as per the data sheet.

1.2 Kit Contents

Table 1-1. Kit List

Designator	Quantity	Description	Material Type	Packaging
PCB1	1	TLV61040QEVM-166, Circuit Board	EEE	Bag, ESD
BOX1	1	Box, Cardboard	Cardboard	Box
FM1	2	Foam, Antistatic	Plastic	Foam
LBL1	2	Label, Small & Large standard labels	Paper/card stock	Paper
LIT1	1	Literature, EVM Disclaimer Read Me	Paper/card stock	Paper

1.3 Specification

[Table 1-2](#) provides a summary of the TLV61040QEVM-166 performance specifications. All the specifications are given for an ambient temperature of 25°C.

Table 1-2. Performance Specification

Parameter	Value	Unit
Input voltage	2 - 14	V
Output voltage	18	V
Typical fixed peak current limit	400	mA
Output current	0 - 7 (When $V_{in} \geq 2V$) 0 - 20 (When $V_{in} \geq 5V$)	mA

1.4 Device Information

The TLV61040-Q1 is a high voltage non-synchronous boost converter with a 200mΩ low side power switch, which provides a high efficiency and small size option. The TLV61040-Q1 has a wide input voltage range of 1.8V to 20V, and the output voltage covers up to 28V with a typical peak current limit of 400mA. The TLV61040-Q1 has internal compensation, 2.5ms soft start time, and thermal shutdown protection.

2 Hardware

2.1 Test Setup

Jumper	Description
J1	Input voltage positive connection
J2	Input voltage return connection
J3	Output voltage positive connection
J4	Output voltage return connection
J5	EN pin input jumper. Place a jumper across EN and On to turn on the IC. Place a jumper across EN and Off to turn off the IC.
TP1	Input voltage positive sensing node for measuring efficiency
TP2	Input voltage negative sensing node for measuring efficiency
TP3	Output voltage positive sensing node for measuring efficiency
TP4	Output voltage negative sensing node for measuring efficiency
TP5 (SW)	Test point to measure SW pin waveform
TP6	Test point to measure bode plot

2.2 Modification

The external components of the TLV61040-Q1 device can be modified to adjust the output voltage of real applications.

2.3 Input Capacitor C1

The 47 μ F, 35V aluminum capacitor C1 is added as the input capacitor in the EVM. The capacitor is not necessary and can be removed in a real application.

2.4 Precautions



CAUTION

Hot surface.
 Contact can cause burns.
 Do not touch!

3 Hardware Design Files

3.1 Schematic

Figure 3-1 shows the TLV61040QEV-166 schematic.

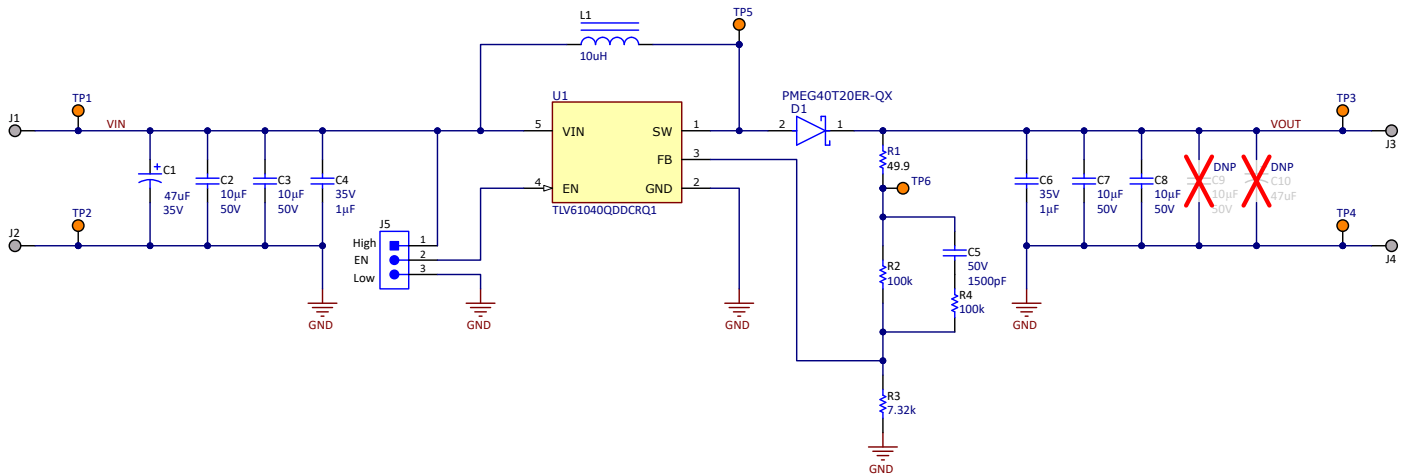


Figure 3-1. Schematic

3.2 PCB Layout

The TLV61040QEV-166 board is a 2-layer, 1oz copper thick PCB. All the components are placed on the top layer. Figure 3-2 and Figure 3-3 show the top view and bottom view.

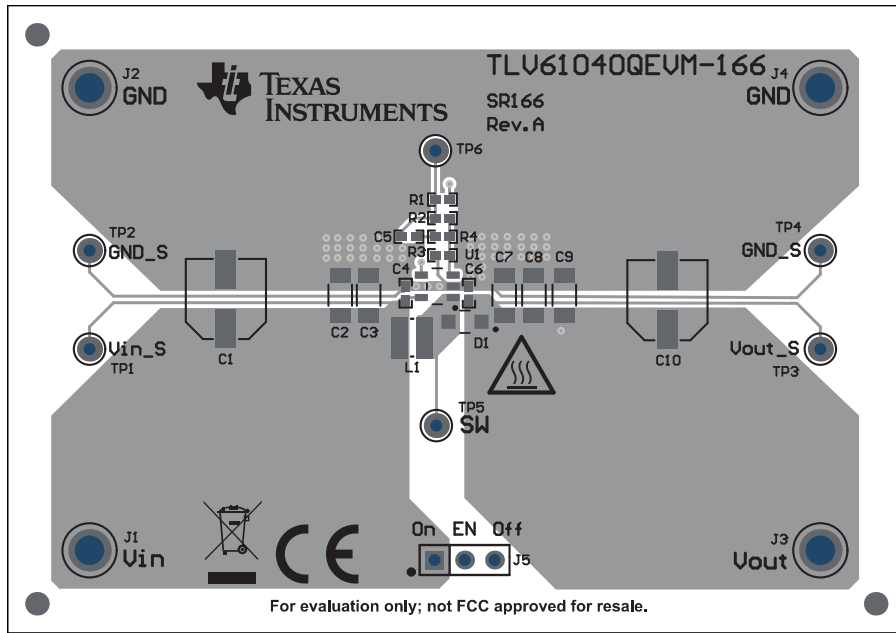


Figure 3-2. Top-Side Layout

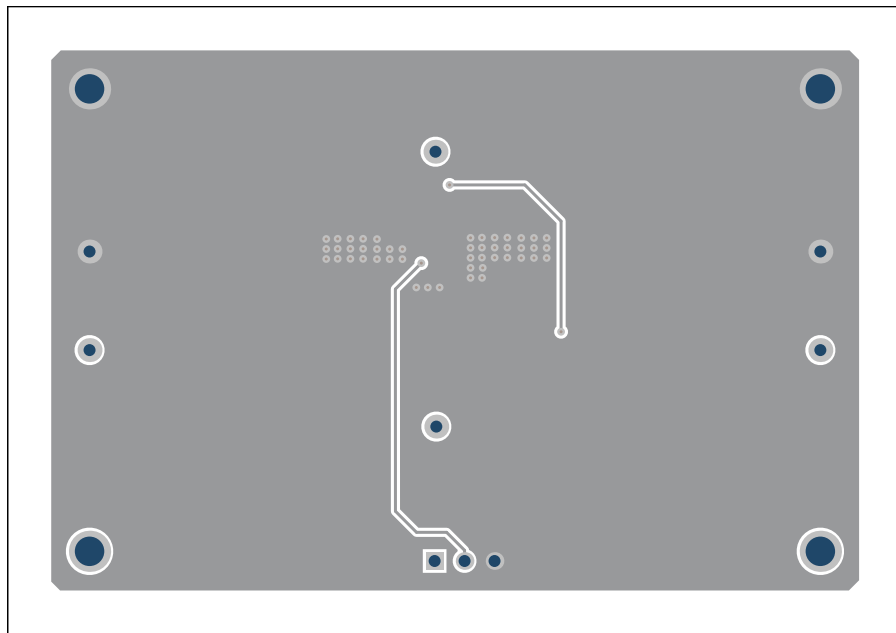


Figure 3-3. Bottom-Side Layout

3.3 Bill of Materials

Table 3-1 lists the BOM of the TLV61040QEVM-166.

Table 3-1. TLV61040QEVM-166 Bill of Materials

Designator	Qty	Value	Description	PackageReference	PartNumber	Manufacturer
C1	1	47 μ F	CAP, AL, 47 μ F, 35V, +/- 20%, 0.36 ohm, AEC-Q200 Grade 2, SMD	SMT Radial D	EEE-FK1V470P	Panasonic
C2, C3, C7, C8	4	10 μ F	CAP, CERM, 10 μ F, 50V,+/- 10%, X7R, AEC-Q200 Grade 1, 1206	1206	CGA5L1X7R1H106K160AC	TDK
C4, C6	2	1 μ F	CAP, CERM, 1 μ F, 35V,+/- 10%, X5R, AEC-Q200 Grade 3, 0402	0402	GRT155R6YA105KE13D	MuRata
C5	1	1.5nF	CAP, CERM, 1500pF, 50V,+/- 5%, X7R, 0402	0402	GRM155R71H152JA01D	MuRata
D1	1		40V, 2A low VF Trench MEGA Schottky barrier rectifier, SOD123W	SOD123W	PMEG40T20ER-QX	Nexperia
J1, J2, J3, J4	4		Terminal, Turret, TH, Double	Keystone1502-2	1502-2	Keystone
J5	1		Header, 100mil, 3x1, Tin, TH	Header, 3 PIN, 100mil, Tin	PEC03SAAN	Sullins Connector Solutions
L1	1	10 μ H	Inductor, Shielded, 10uH, 1.2A, 0.322 Ω , SMD	SMD, 2-Leads, Body 3.2x3.2mm	74438336100	Würth Elektronik
R1	1	49.9	RES, 49.9, 1%, 0.063W, AEC-Q200 Grade 0, 0402	0402	CRCW040249R9FKED	Vishay-Dale
R2, R4	2	100k	RES, 100k, 0.5%, 0.063W, AEC-Q200 Grade 0, 0402	0402	CRCW0402100KDHEDP	Vishay-Dale
R3	1	7.32k	RES, 7.32k, 1%, 0.063W, AEC-Q200 Grade 0, 0402	0402	CRCW04027K32FKED	Vishay-Dale
SH-J1	1		Shunt, 2.54mm, Gold, Black	Shunt, 2.54mm, Black	60900213421	Würth Elektronik
TP1, TP2, TP3, TP4, TP5, TP6	6		Test Point, Miniature, Orange, TH	Orange Miniature Testpoint	5003	Keystone Electronics
U1	1		20VIN, 28VOUT, 400mA Non-synchronous Boost Converter	SOT-23-5	TLV61040QDDCRQ1	Texas Instruments

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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

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.

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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
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-
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