EVM User's Guide: TPS552852EVM

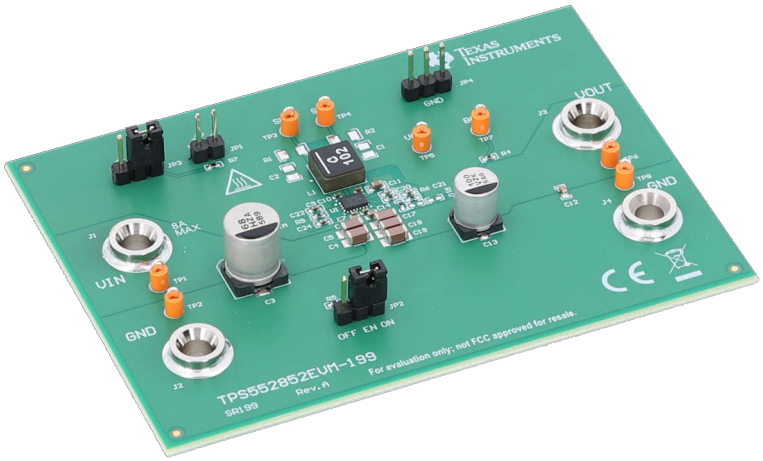
TPS552852 Evaluation Module

Description

The TPS552852EVM helps to evaluate the behavior and performance of the TPS552852 at different input voltages, output voltages, and load conditions. This EVM is designed for 2.4V to 22V input voltage and 12V default output voltage applications. This EVM has test points for Vin, Vout, SW1, SW2, VCC, and Bode plot test, and also has a jumper to set light load mode and PG function.

Features

- Wide input and output voltage range
- ±1% reference voltage accuracy
- Programmable output current limit
- High efficiency over entire load range
- External adjustable compensation network
- Rich protection



1 Evaluation Module Overview

This user's guide describes the characteristics, operation, and the use of the TPS552852EVM evaluation module (EVM). The EVM contains the TPS552852 device, which is a high-performance, high-efficiency synchronous buck-boost converter which integrates four MOSFETs. The user's guide includes EVM specifications, recommended test setup, test result, schematic diagram, bill of materials, and the board layout.

1.1 Introduction

1.2 Kit Contents

Table 1-1. Kit Contents for TPS552852EVM

Designator	Quantity	Description	Part Number	Manufacturer	Weight	Length	Width	Height	Material Type	Packaging
PCB1	1	TPS552852EVM-199; Circuit Board; CDDS 6656116	SR199	Texas Instruments	50.00	3.62	2.60	1.00	EEE	Bag, ESD
BOX1	1	Box, Cardboard	TIBX011	Leaman	57.00	5.75	4.50	2.00	Cardboard	Box
FM1	2	Foam, Antistatic	TIFM004	Leaman	13.00	5.63	4.38	1.00	Plastic	Foam
LBL1	1	Label, Small & Large standard labels (Standard unless specified)	SLLF003 / SLLF002	Print on Demand	2.0				Paper/ Cardstock	Paper
LIT1	1	Literature, EVM Disclaimer Read Me - (Goes in all kits)	SZZC019	Print on Demand	7.0				Paper/ Cardstock	Paper

1.3 Performance Specification

Table 1-2 provides a summary of the TPS552852EVM performance specifications. All specifications are given for an ambient temperature of 25°C.

Table 1-2. Performance Specification Summary

Parameter	Test Condition	Value	Unit
Input Voltage	N/A	2.4 - 22	V
Output Voltage	N/A	12	V
Maximum Output Current	V_{IN} ≥ 6 V	3	A
	V_{IN} ≥ 9V	4	
	V_{IN} ≥ 12V	5	
Default Switching Frequency	N/A	2.1	MHz

1.4 Device Information

The TPS552852 is a fully integrated synchronous buck-boost converter that is optimized for converting battery voltage or adaptor voltage into power supply rails. The TPS552852 integrates four 15mΩ MOSFETs to provide a high efficiency and small size solution. It features 8A average inductor current limit and can supply up to 7A output current in buck mode. When working in boost mode, it can deliver 60W from 12V input or 30W from 5V input. The TPS552852 offers input and output over-voltage protection, average inductor current limit, cycle-by-cycle peak current limit and output short circuit protection. The TPS552852 also ensures safe operating with output current limit without external output current sense resistor and hiccup mode protection in sustained overload conditions.

The factory default settings of the TPS552852EVM allow the operation with an input voltage range from 2.4V to 22V and a 12V output voltage. Customer can adjust the output voltage by changing the FB divider resistance and adjust output current limit by changing the ILIM resistor.

2 Hardware

2.1 Modification

The printed-circuit board (PCB) for this EVM is designed to accommodate some modifications by the user. The external component can be changed according to the real application.

2.2 Connector and Test Point Descriptions

This EVM includes I/O connectors and test points as shown in Table 2-1. The power supply must be connected to input connectors, J1 and J2. The load must be connected to output connectors, J3 and J4.

Table 2-1. Connectors and Test Points

Reference Designator	Description
J1	Input voltage positive connection
J2	Input voltage return connection
J3	Output voltage connection
J4	Output voltage return connection

2.3 Connector, Test Point and Jumper Descriptions

This section describes how to properly connect, set up, and use the TPS552852EVM.

2.3.1 Jumper Configuration

2.3.1.1 JP2 (ENABLE)

The JP2 jumper enables the device. By default, this jumper is set to the OFF position. If Vin>5.1V, put this jumper in the ON position to enable the output. Put this jumper in the OFF position to disable the output. If Vin<5.1V, connect EN to an external 3V power supply or adjust R3, R5 resistor values according to datasheet EV/UVLO function description, note that EN/UVLO pin max voltage is 6V.

2.3.1.2 JP3 (MODE)

MODE pin input jumper. Place a jumper across MODE and FPWM to set in forced PWM mode, place a jumper across MODE and PFM to set in auto PFM mode. Apply an external clock signal to synchronize switching frequency.

2.4 Test Procedure

Use the following steps for the test procedure:

1. Set the power supply current limit to 10 A. Set the power supply to something around 12 V. Turn off the power supply. Connect the positive output of the power supply to J1 and the negative output to J2.
2. Connect the load to J3 for the positive connection and J4 for the negative connection.
3. Turn on the power supply.
4. Slowly increase the load while monitoring the output voltage between J3 and J4. It must remain in regulation when the load current is lower than 4 A.
5. Slowly sweep the input voltage from 9 V to 20 V. The output voltage must remain in regulation when the load current is lower than the maximum load current specified in Table 1-2.
6. Turn off the load, turn off the power supply. Then turn on the load to discharge the output capacitors.

3 Hardware Design Files

This section provides the TPS552852EVM schematic, bill of materials (BOM), and board layout.

3.1 Schematic

Figure 3-1 shows the EVM schematic.

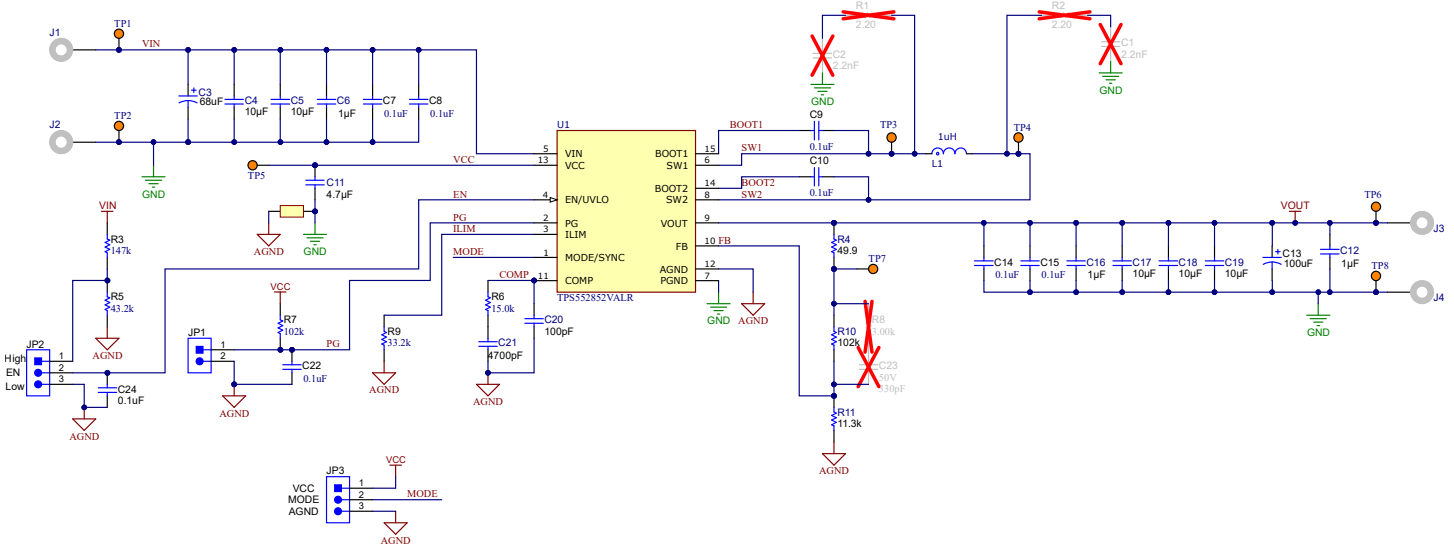


Figure 3-1. TPS552852EVM Schematic

3.2 Board Layout

Figure 3-2 through Figure 3-5 illustrate the EVM board layouts.

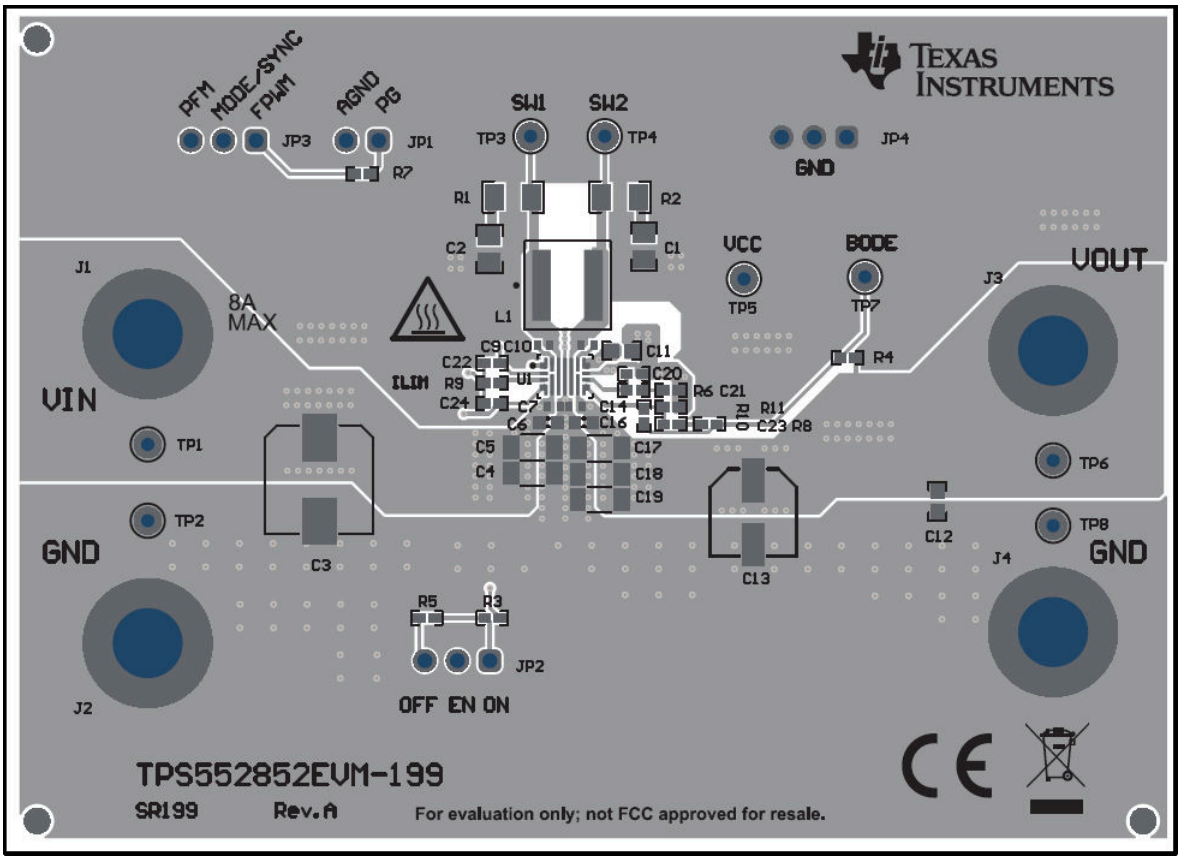


Figure 3-2. TPS552852EVM Top-Side Layout

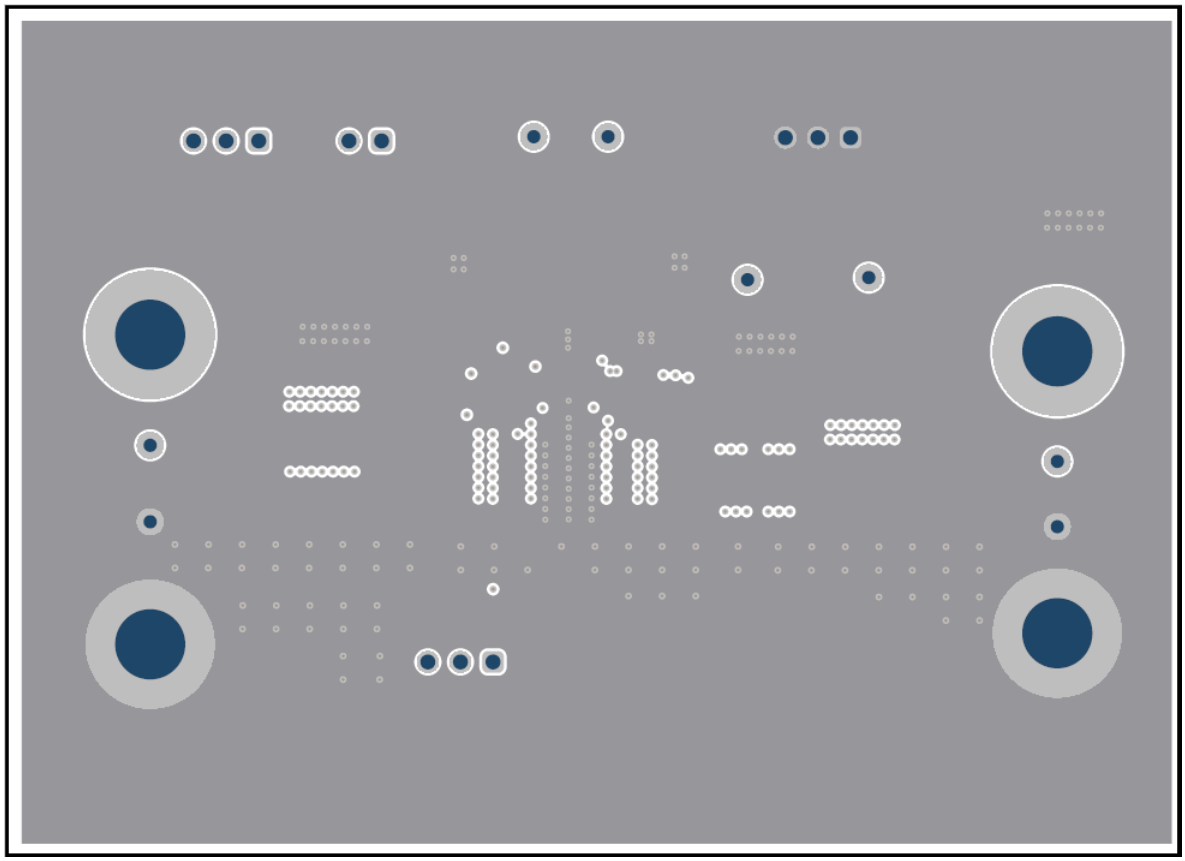


Figure 3-3. TPS552852EVM Inner Layer1

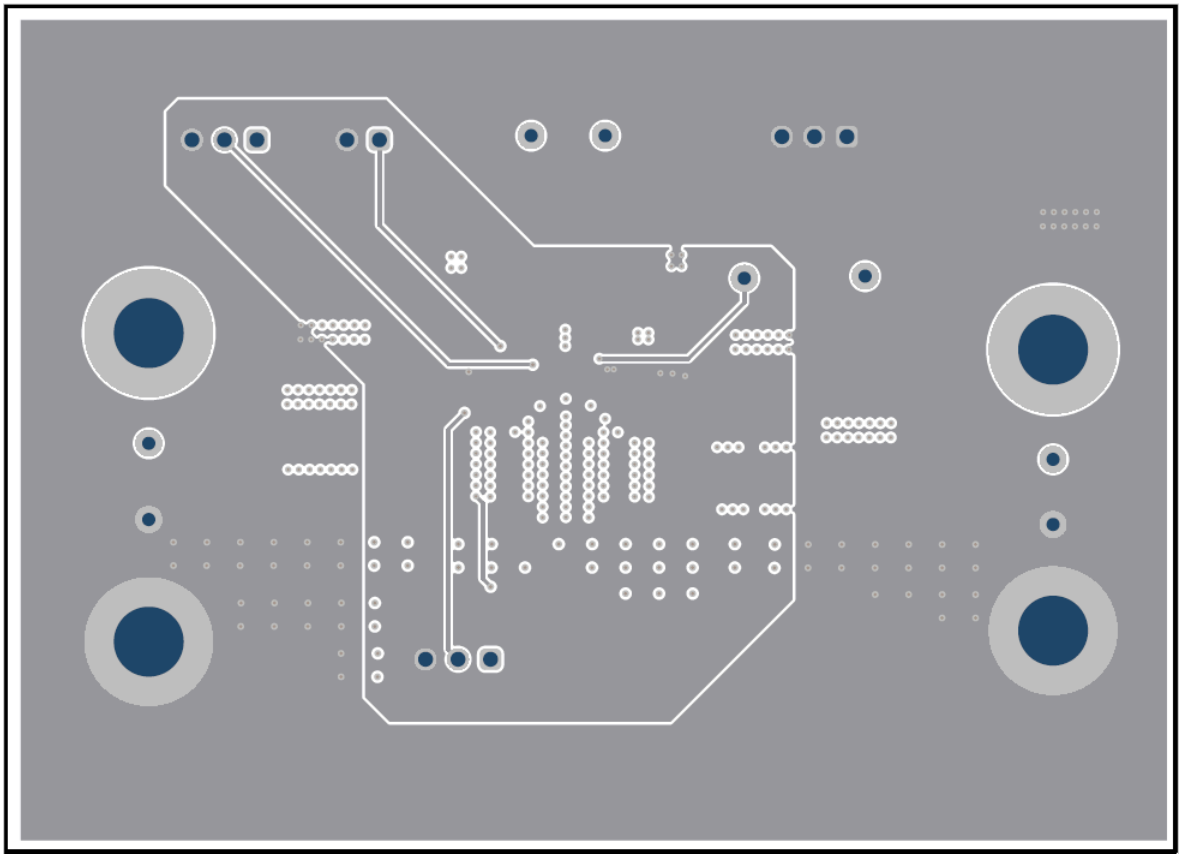


Figure 3-4. TPS552852EVM Inner Layer2

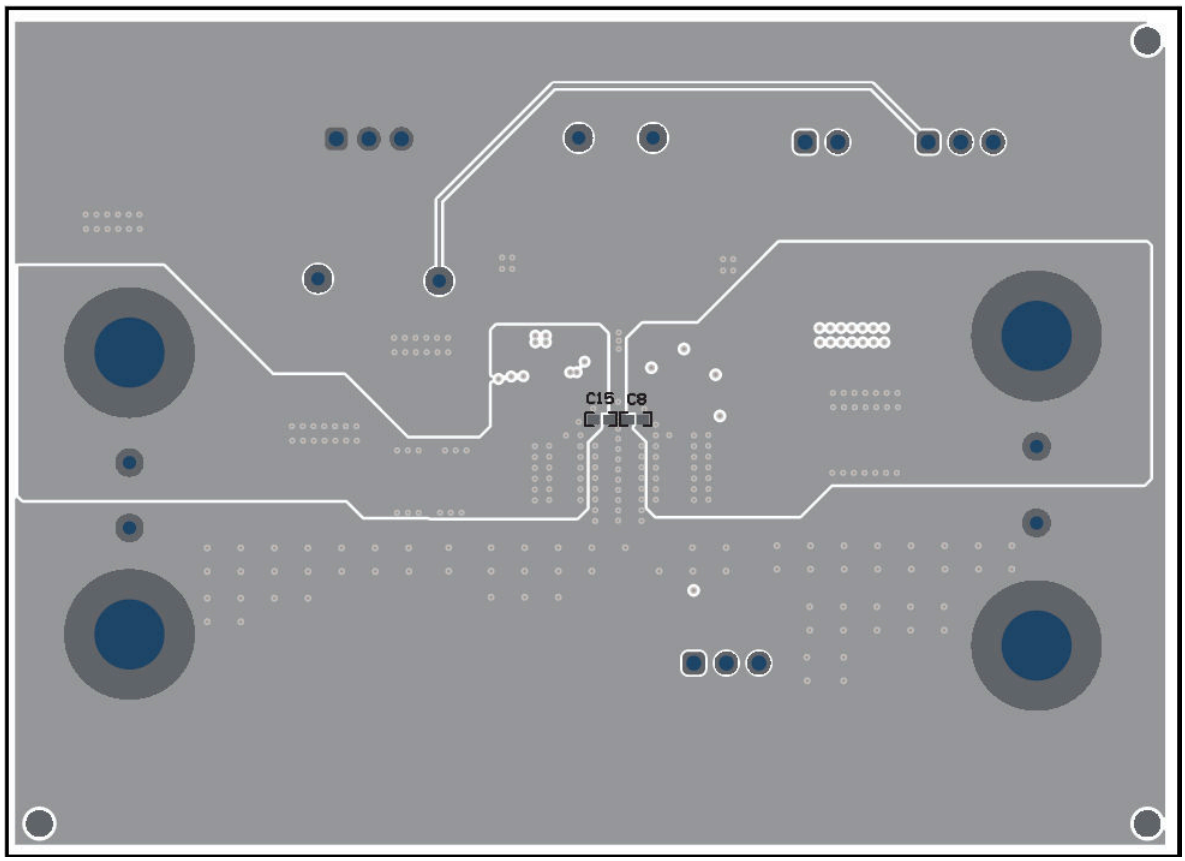


Figure 3-5. TPS552852EVM Bottom-Side Layout

3.3 Bill of Materials

Table 3-1 lists the EVM bill of materials.

Table 3-1. Bill of Materials

Designator	Quantity	Value	Description	PackageReference	PartNumber	Manufacturer
C3	1	68uF	CAP, Polymer Hybrid, 68 uF, 50 V, +/- 20%, 30 ohm, 8x10 SMD	8x10	EEHZA1H680P	Panasonic
C4, C5, C17, C18, C19	5	10uF	CAP, CERM, 10 µF, 50 V,+/- 10%, X7R, AEC-Q200 Grade 1, 1206	1206	CGA5L1X7R1H106K160AC	TDK
C6, C12, C16	3	1uF	CAP, CERM, 1 µF, 50 V,+/- 20%, X5R, AEC-Q200 Grade 3, 0603	0603	GRT188R61H105ME13D	MuRata
C7, C8, C9, C10, C14, C15, C22	7	0.1uF	CAP, CERM, 0.1 uF, 50 V, +/- 20%, X7R, 0402	0402	GRM155R71H104ME14D	MuRata
C11	1	4.7uF	CAP, CERM, 4.7 µF, 16 V,+/- 10%, X5R, AEC-Q200 Grade 3, 0603	0603	GRT188R61C475KE13D	MuRata
C13	1	100uF	CAP, AL, 100 uF, 35 V, AEC-Q200 Grade 2, SMD	D6.3xL5.8mm	EEHZK1V101XP	Panasonic
C20	1	100pF	CAP, CERM, 100 pF, 50 V, +/- 5%, C0G/NP0, AEC-Q200 Grade 1, 0402	0402	CGA2B2C0G1H101J050BA	TDK
C21	1	4700pF	CAP, CERM, 4700 pF, 50 V, +/- 10%, X7R, AEC-Q200 Grade 1, 0402	0402	CGA2B2X7R1H472K050BA	TDK
C24	1	0.1uF	CAP, CERM, 0.1 uF, 50 V, +/- 10%, X7R, AEC-Q200 Grade 1, 0402	0402	CGA2B3X7R1H104K050BB	TDK
J1, J2, J3, J4	4		Standard Banana Jack, Uninsulated, 6.73mm	Standard Banana Jack, Uninsulated, 6.73mm	575-6	Keystone
JP1	1		Header, 2.54 mm, 2x1, Gold, TH	Header, 2.54mm, 2x1, TH	61300211121	Wurth Elektronik
JP2, JP3, JP4	3		Header, 2.54 mm, 3x1, Gold, TH	Header, 2.54mm, 3x1, TH	61300311121	Wurth Elektronik
L1	1	1uH	1 µH Shielded Molded Inductor 18.1 A 4.9mOhm Max Nonstandard	SMT2_6MM51_6MM71	XGL6030-102MEC	Coilcraft
R3	1	147k	RES, 147 k, 1%, 0.063 W, AEC-Q200 Grade 0, 0402	0402	CRCW0402147KFKED	Vishay-Dale
R4	1	49.9	RES, 49.9, 1%, 0.063 W, AEC-Q200 Grade 0, 0402	0402	CRCW040249R9FKED	Vishay-Dale
R5	1	43.2k	RES, 43.2 k, 1%, 0.063 W, AEC-Q200 Grade 0, 0402	0402	CRCW040243K2FKED	Vishay-Dale
R6	1	15.0k	RES, 15.0 k, 1%, 0.063 W, AEC-Q200 Grade 0, 0402	0402	CRCW040215K0FKED	Vishay-Dale
R7, R10	2	102k	RES, 102 k, 1%, 0.063 W, AEC-Q200 Grade 0, 0402	0402	CRCW0402102KFKED	Vishay-Dale
R9	1	33.2k	RES, 33.2 k, 1%, 0.063 W, AEC-Q200 Grade 0, 0402	0402	CRCW040233K2FKED	Vishay-Dale
R11	1	11.3k	RES, 11.3 k, 1%, 0.063 W, AEC-Q200 Grade 0, 0402	0402	CRCW040211K3FKED	Vishay-Dale
SH-JP1, SH-JP2	2		Shunt, 2.54mm, Gold, Black	Shunt, 2.54mm, Black	60900213421	Wurth Elektronik

Table 3-1. Bill of Materials (continued)

Designator	Quantity	Value	Description	PackageReference	PartNumber	Manufacturer
TP1, TP2, TP3, TP4, TP5, TP6, TP7, TP8	8		Test Point, Miniature, Orange, TH	Orange Miniature Testpoint	5003	Keystone Electronics
U1	1		TPS552852VALR	WQFN-HR15	TPS552852VALR	Texas Instruments
C1, C2	0	2200pF	CAP, CERM, 2200 pF, 250 V, +/- 10%, X7R, 0805	0805	GRM21AR72E222KW01D	MuRata
C23	0	330pF	CAP, CERM, 330 pF, 50 V, +/- 10%, X7R, AEC-Q200 Grade 1, 0402	0402	CGA2B2X7R1H331K050BA	TDK
FID1, FID2, FID3, FID4, FID5, FID6	0		Fiducial mark. There is nothing to buy or mount.	N/A	N/A	N/A
R1, R2	0	2.2	RES, 2.20, 1%, 0.25 W, AEC-Q200 Grade 0, 1206	1206	ERJ-8RQF2R2V	Panasonic
R8	0	3.00k	RES, 3.00 k, 1%, 0.063 W, AEC-Q200 Grade 0, 0402	0402	CRCW04023K00FKED	Vishay-Dale

4 Additional Information

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 March 2, 2026 to March 31, 2026 (from Revision * (March 2026) to Revision A (March 2026))	Page
• Updated document to EVM Guide standards	2

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