TLV62085EVM-764 Evaluation Module

This user's guide describes the characteristics, operation, and use of TI's TLV62085 evaluation module (EVM). This EVM is designed to easily evaluate and test the operation and functionality of the TLV62085. The EVM converts a 2.5-V to 6-V input voltage to a regulated 1.2-V output voltage that delivers 3 A. This user's guide includes setup instructions for the hardware, EVM printed-circuit board (PCB) layouts, a schematic diagram, a bill of materials, and test results for the EVM.

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1 Introduction

The TLV62085 is a 3-A, synchronous, step-down converter in a 2×2-mm, 7-pin QFN package.

1.1 Performance Specification

Table 1 provides a summary of the TLV62085EVM-764 performance specifications. All specifications are given for an ambient temperature of 25°C and an input voltage of 5 V.

Table 1. Performance Specification Summary

Specification	Test Conditions	Min	Typ	Max	Unit
Input Voltage		2.5	5	6	V
Output Voltage			1.2		V
Output Current		0		3	A
Peak Efficiency	V_{IN} = 2.5 V		91.8 %		
Soft-Start Time	Ramp Time of V_{OUT}		800		µs

1.2 Thermal Data

Table 2 shows the TLV62085EVM-764 thermal data after considering the PCB design of real applications. The big copper planes connecting to the pads of the IC on the PCB improve the thermal performance of the device.

Table 2. TLV62085EVM-764 Thermal Data

Thermal Metric (1)		TLV62085EVM-764	Unit
θ_{JA_EVM}	Junction-to-ambient thermal resistance of EVM	69.8	°C/W
ψ_{JT}	Junction-to-top characterization parameter of EVM	1.4	
ψ_{JB}	Junction-to-board characterization parameter of EVM	33.8	

(1) For more information about traditional and new thermal metrics, see the *IC Package Thermal Metrics* application report, SPRA953.

1.3 Modifications

The PCB for this EVM is designed to accommodate additional output capacitors. As well, the loop response of the IC can be measured.

1.3.1 Output Capacitors

C3 and C4 are provided for additional output capacitors. These capacitors are not required for proper operation but can be used to reduce the output voltage ripple and to improve the load transient response.

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1.3.2 Loop Response Measurement

The loop response of the TLV62085EVM-764 can be measured with two simple changes to the circuitry. First, install a 10-Ω resistor across the pads in the middle of the back of the PCB. The pads are spaced to allow installation of an 0603-sized resistor. Second, cut the short section of trace between the vias on the back of the PCB. This change is shown in Figure 1. With these changes, an ac signal (10-mV, peak-to-peak amplitude recommended) can be injected into the control loop across the added resistor. Details of measuring the control loop of DCS-Control devices are found in SLVA465. The results of this test are shown in Figure 3.

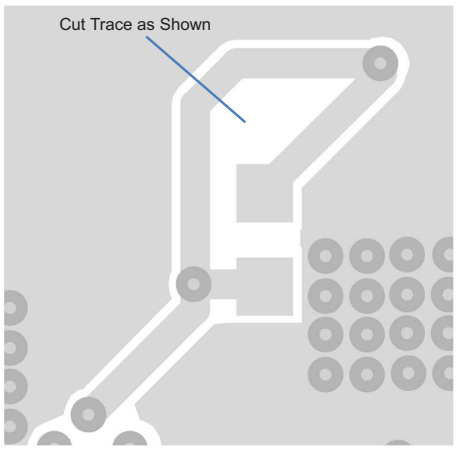


Figure 1. Loop Response Measurement Modification

2 Setup

This section describes how to properly use the TLV62085EVM-764.

2.1 Input and Output Connector Descriptions

J1 – VIN	Positive input connection from the input supply for the EVM.
J2 – S+, S–	Input voltage sense connections. Measure the input voltage at this point.
J3 – GND	Return connection from the input supply for the EVM.
J4 – VOUT	Output voltage connection.
J5 – S+, S–	Output voltage sense connections. Measure the output voltage at this point.
J6 – GND	Output return connection.
J7 – PG, GND	The PG output appears on pin 1 of this header with a convenient ground on pin 2.
JP1 – EN	EN pin input jumper. Place the supplied jumper across ON and EN to turn on the IC. Place the jumper across OFF and EN to turn off the IC.
JP2 – PG Pullup Voltage	PG pin pullup voltage jumper. Place the supplied jumper on JP2 to connect the PG pin pullup resistor to Vin. Alternatively, the jumper can be removed and a different voltage can be supplied on pin 1 to pull up the PG pin to a different level. This externally applied voltage should remain below 6 V.

2.2 Setup

To operate the EVM, set jumpers JP1 and JP2 to the desired positions per Section 2.1. Connect the input supply to J1 and J3 and connect the load to J4 and J6.

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3 TLV62085EVM-764 Test Results

The TLV62085EVM-764 was used to take the data in the TLV62085 data sheet, SLVSD63. See the device data sheet for the performance of this EVM.

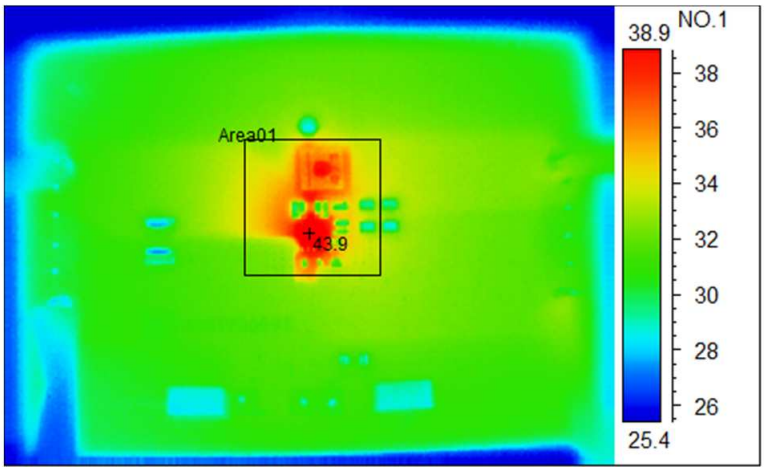


Figure 2. Thermal Performance (V_{IN} = 5 V, Load = 3 A)

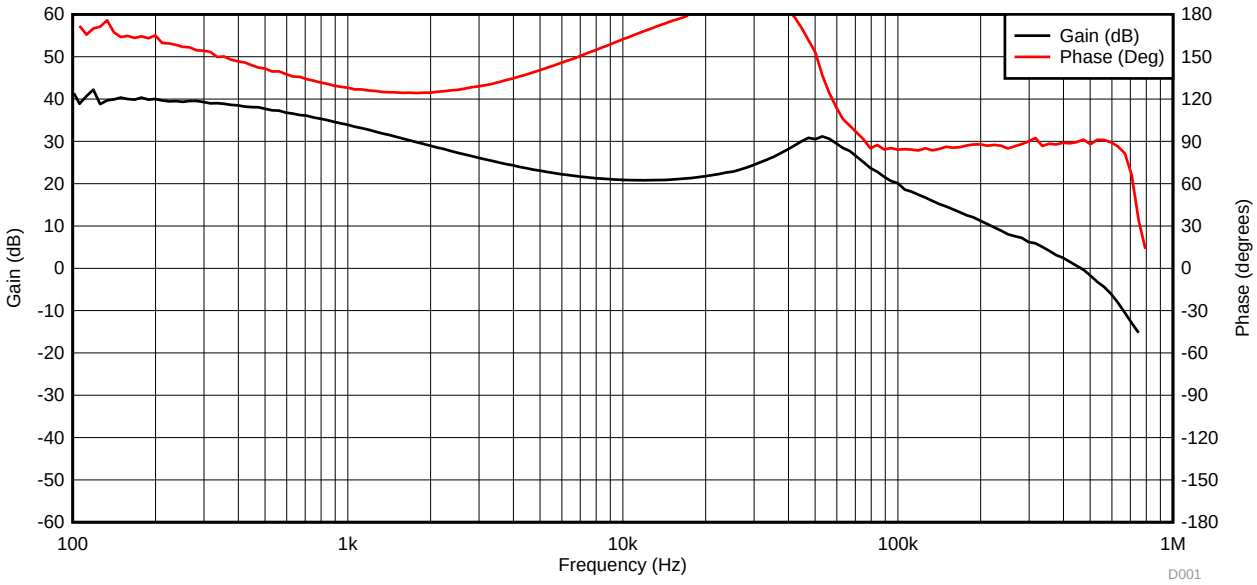


Figure 3. Loop Response Measurement (V_{IN} = 5 V, Load = 3 A)

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4 Board Layout

This section provides the TLV62085EVM-764 board layout and illustrations. The gerbers are available on the EVM product page: TLV62085EVM-764.

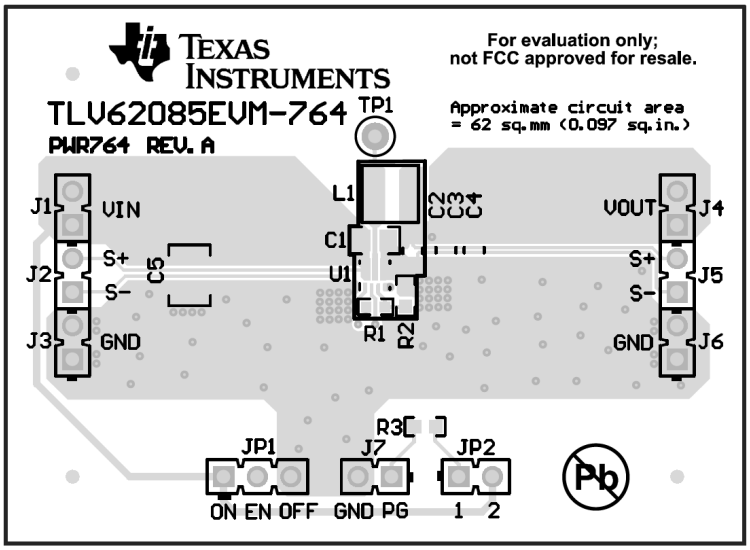


Figure 4. Assembly Layer

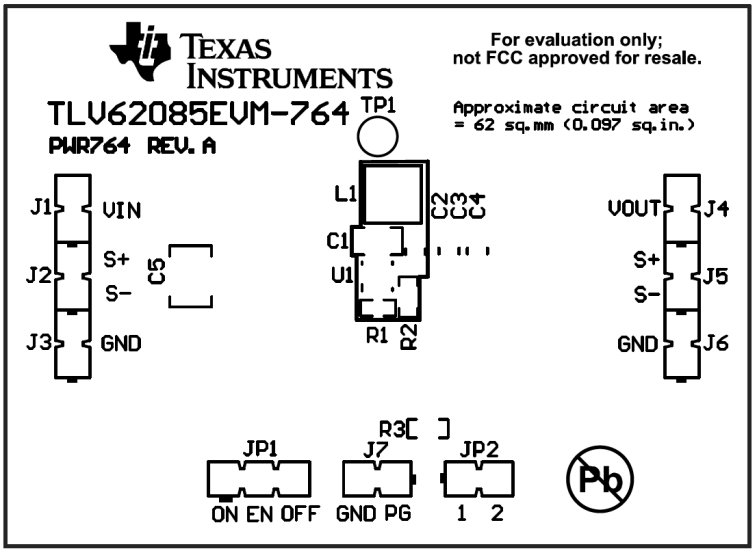


Figure 5. Top Silk Layer

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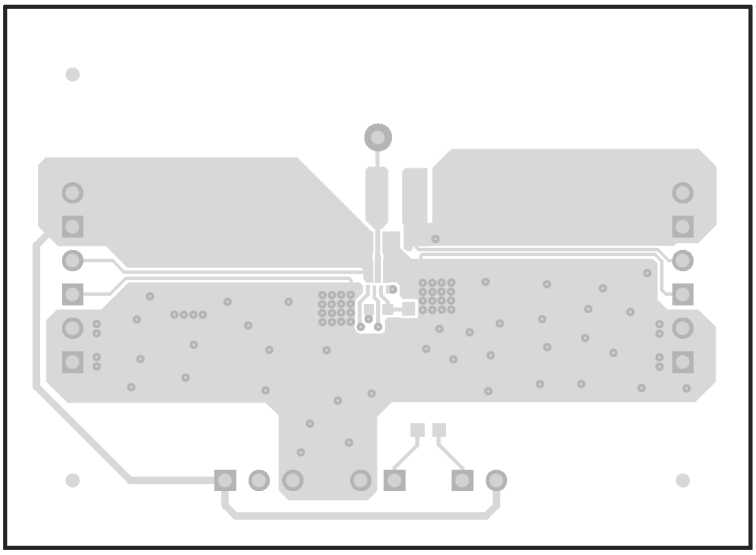


Figure 6. Top Layer

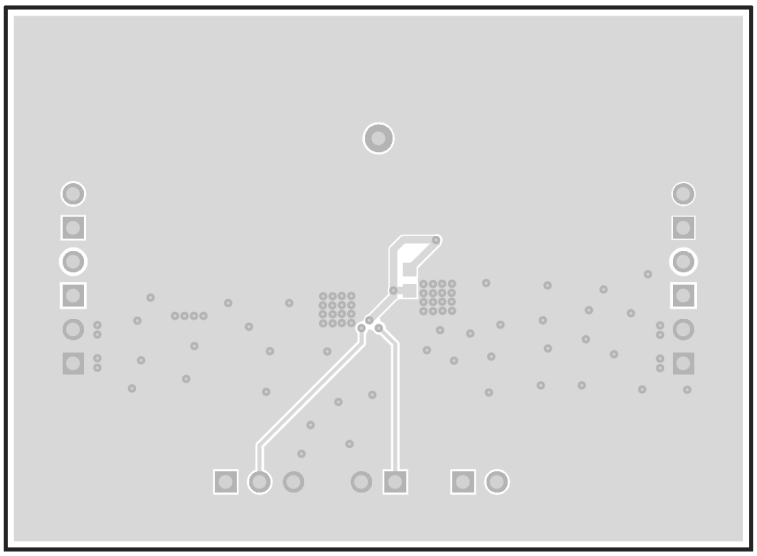


Figure 7. Bottom Layer

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5 Schematic and Bill of Materials

This section provides the TLV62085EVM-764 schematic and bill of materials.

5.1 Schematic

Figure 8 illustrates the EVM schematic.

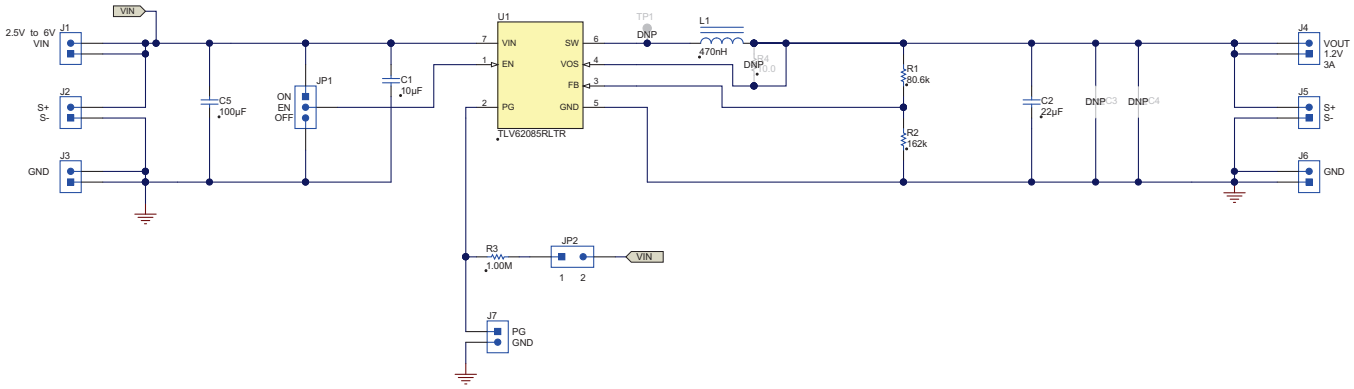


Figure 8. TLV62085EVM-764 Schematic

5.2 Bill of Materials

Table 3. TLV62085EVM-764 Bill of Materials

Count	RefDes	Value	Description	Size	Part Number	MFR
1	C1	10uF	Capacitor, Ceramic Chip, 10V, X7R, ±20%	0805	GRM21BR71A106ME51L	Murata
1	C2	22uF	Capacitor, Ceramic Chip, 10V, X5R, ±20%	0805	GRM21BR61A226ME44	Murata
1	C5	100uF	Capacitor, Ceramic Chip, 6.3V, X5R, ±20%	1210	GRM32ER60J107ME20L	Murata
1	L1	0.47 uH	Inductor, Shielded Power, 6.6A	4mm x 4mm	XFL4015-471ME	Coilcraft
1	R1	80.6k	Resistor, Chip, 1/16W, 1%	0603	Std	Std
1	R2	162k	Resistor, Chip, 1/16W, 1%	0603	Std	Std
1	R3	1.00M	Resistor, Chip, 1/16W, 1%	0603	Std	Std
1	U1	TLV62085	IC, 3A High Efficiency Step Down Converter	2mm x 2mm	TLV62085RLT	TI

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- *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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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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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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