TLV62566-PWR232 Evaluation Module

This user's guide describes the characteristics, operation, and use of TI's TLV62566 evaluation module (EVM). This EVM is designed to help the user easily evaluate and test the operation and functionality of the TLV62566. The EVM converts a 2.7-V to 5.5-V input voltage to a regulated 1.8-V output voltage. The TLV62566 is capable of delivering 1.5-A maximum output current. This user's guide includes setup instructions for the hardware, a printed-circuit board (PCB) layout for the EVM, a schematic diagram, a bill of materials (BOM), and test results for the EVM.

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1 Introduction

The TLV62566 is a 1.5-A output current, synchronous, step-down converter in an SOT23-5 package. The output voltage is adjustable.

1.1 Background

The TLV62566-PWR232 is set to a 1.8-V output. The EVM operates with full-rated performance with an input voltage between 2.7 V and 5.5 V.

1.2 Performance Specification

Table 1 provides a summary of the TLV62566-PWR232 performance specifications. All specifications are given for an ambient temperature of 25°C.

Table 1. Performance Specification Summary

Specification	Test Conditions	Min	Typ	Max	Unit
Input voltage		2.7		5.5	V
Output voltage		1.74	1.8	1.83	V
Output current		0		1500	mA

1.3 Modifications

Because the primary goal of the EVM is to demonstrate the small size of the TLV62566 power supply solution, capacitors and inductors with small footprints were chosen. These capacitors and inductors were carefully selected to maximize efficiency and minimize ripple, while minimizing overall solution size. Changing components could improve or degrade EVM performance.

1.3.1 Output Capacitors

C5 - C7 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. The total output capacitance must remain within the recommended range in the data sheet for proper operation.

1.3.2 Feedforward Capacitor for Better Load Transient

C3 is provided as a feedforward capacitor for optimized load transient response, when needed.

2 Setup

This section describes how to properly use the TLV62566-PWR232.

2.1 Input/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
JP1 – PG Power good connection

2.2 Setup

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

3 TLV62566-PWR232 Test Results

The TLV62566-PWR232 was used to take the data in the TLV62566 datasheet, SLVSBC1. See the device data sheet for the performance of this EVM.

3.1 Loop Response Plot

In order to test the loop response of the TLV62566, a 49.9-Ω resistor should be connected between Vout and R1. By injecting an AC signal across the 49.9-Ω resistor, the loop response bode plot under typical conditions is tested as illustrated in Figure 1.

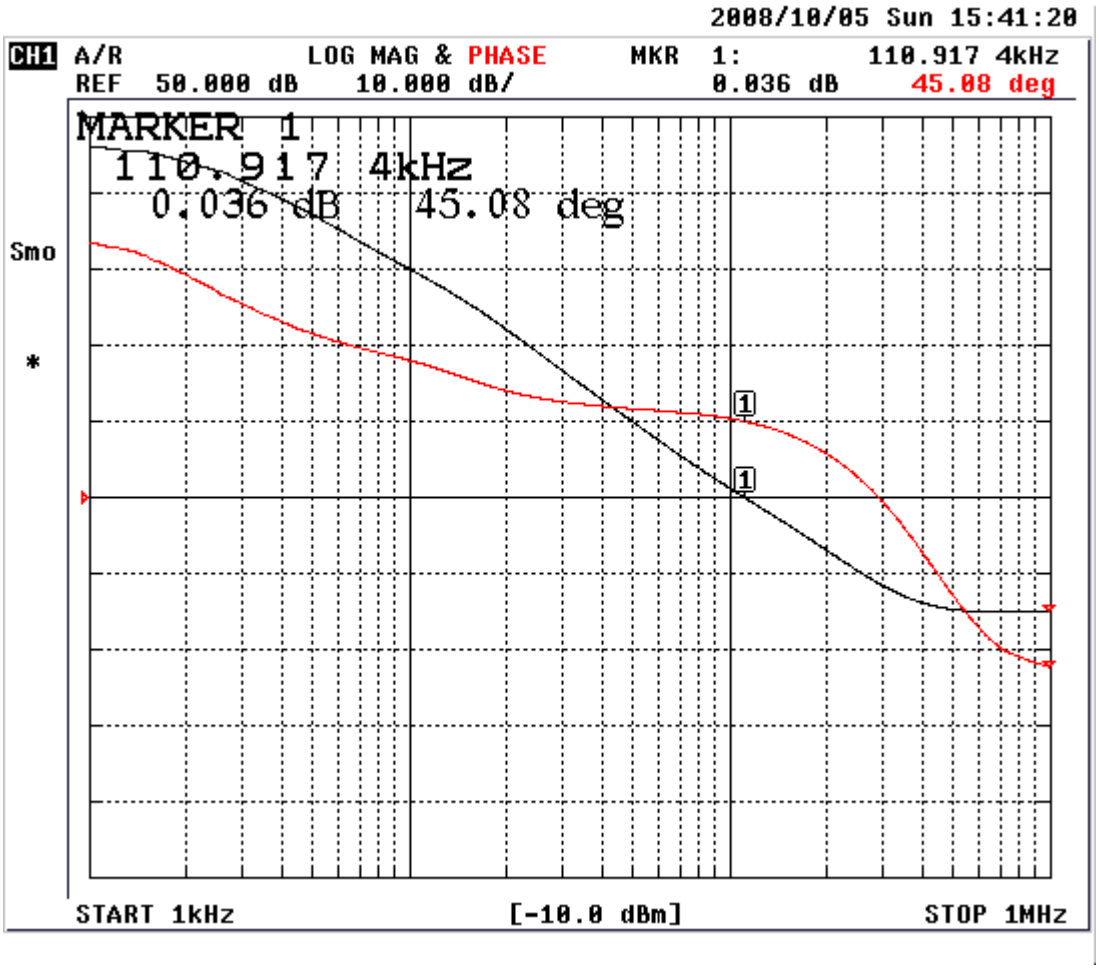

Figure 1. Bode Plot with V_{IN} = 3.6 V, V_{OUT} = 1.8 V, I_{OUT} = 1 A

4 Board Layout

Figure 2 through Figure 5 illustrate the TLV62566-PWR232 PCB layout. The gerbers are available on the EVM product page:TLV62566EVM-232

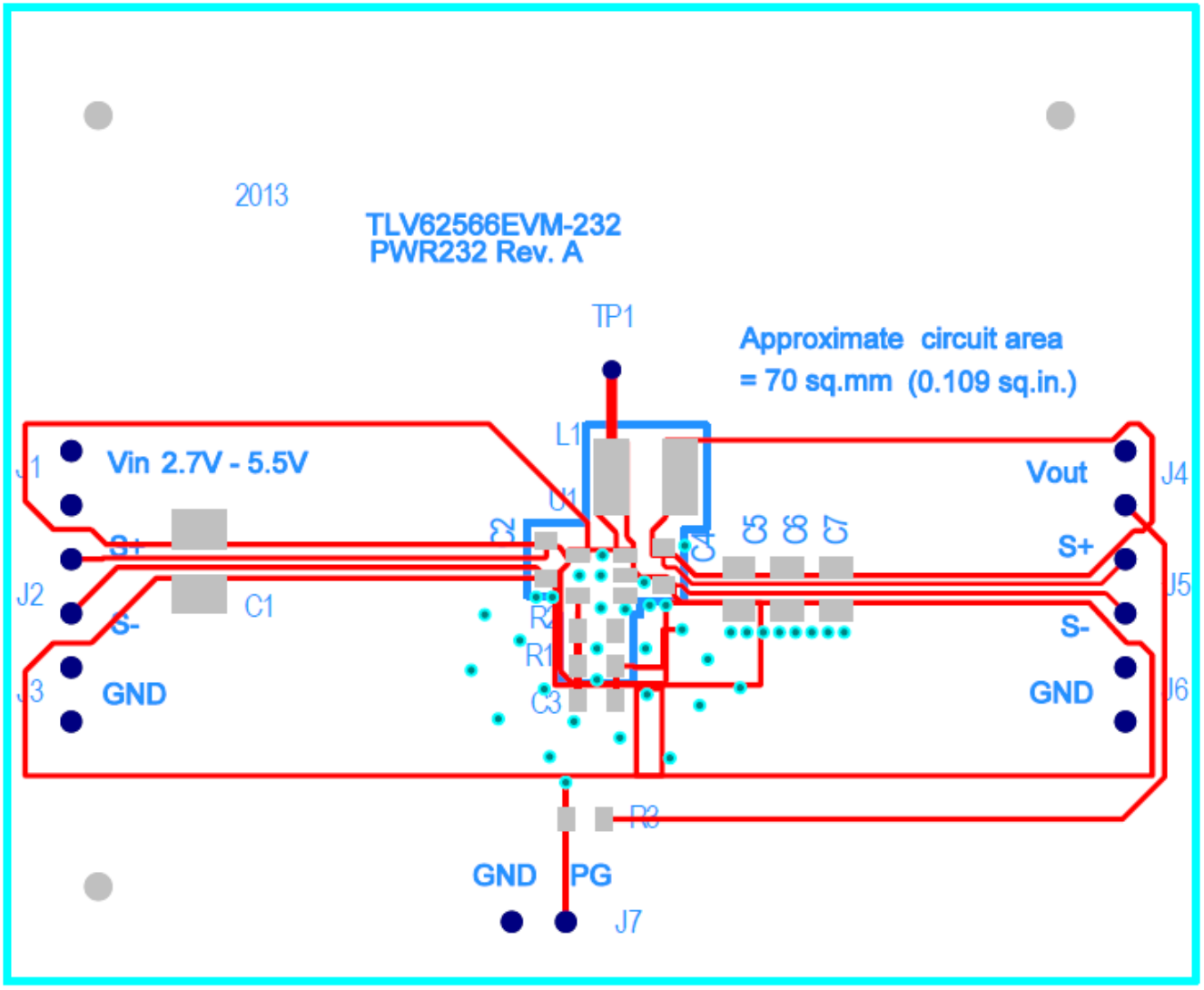

Figure 2. Assembly Layer

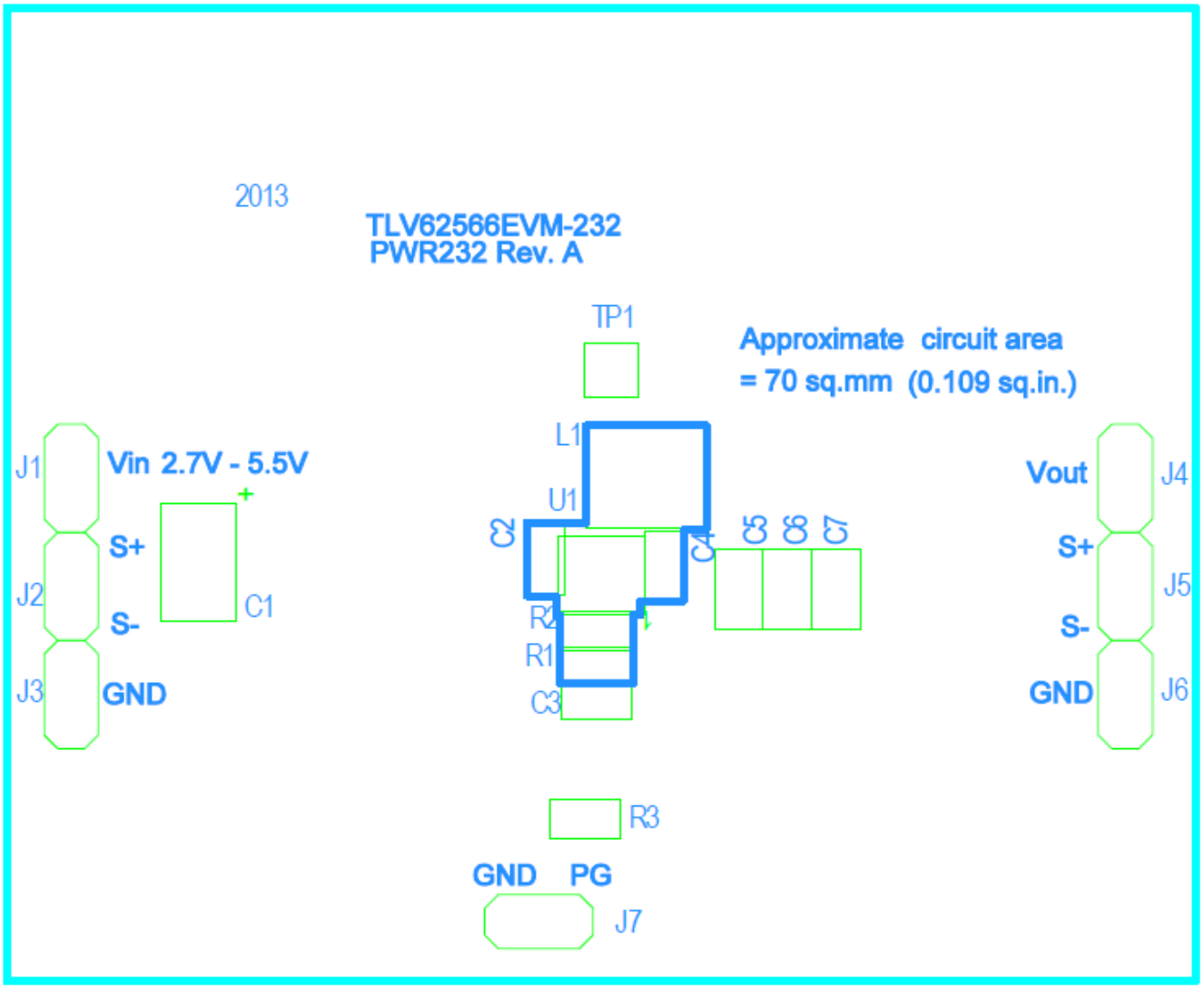

Figure 3. Top Silk Layer

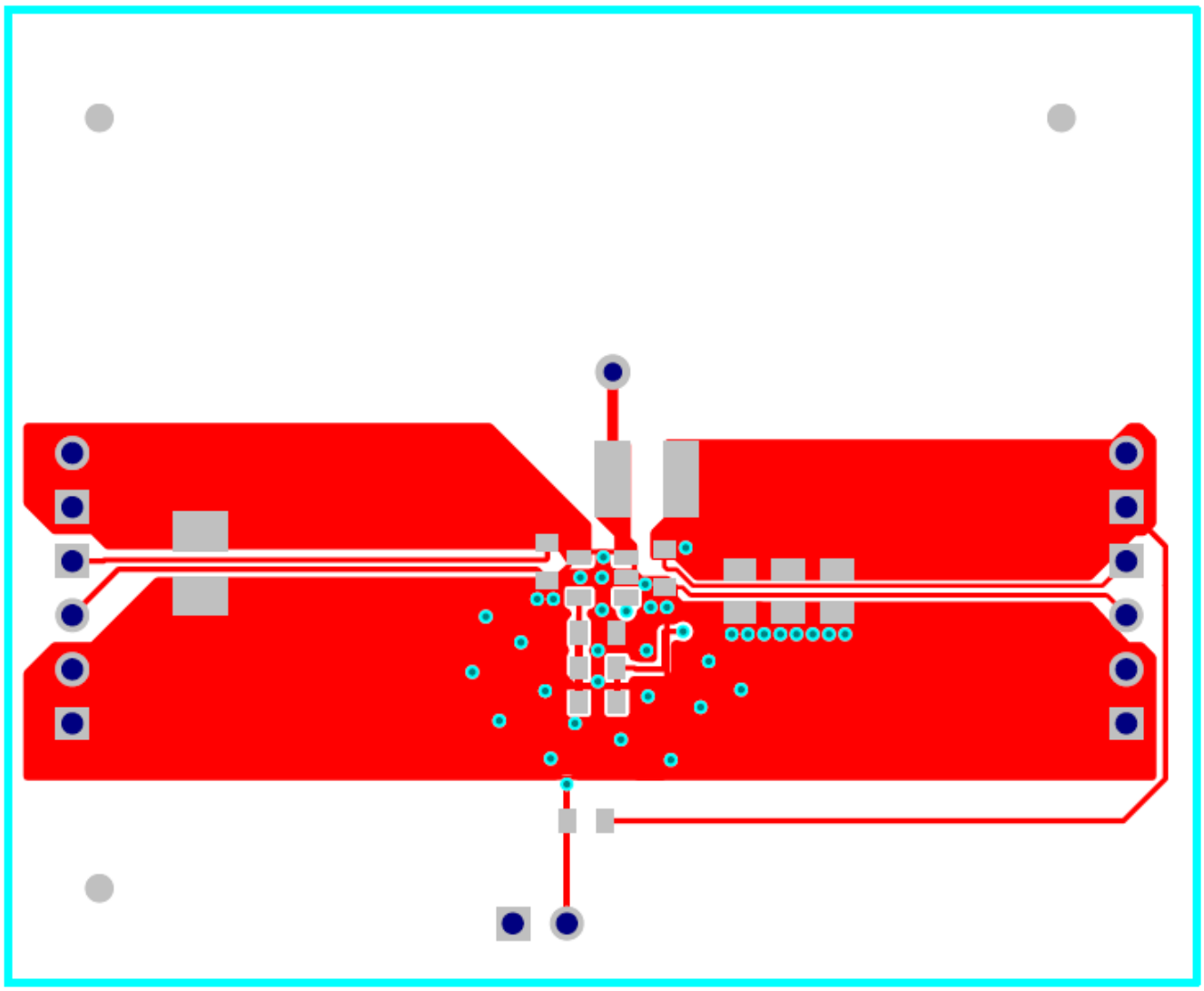

Figure 4. Top Layer

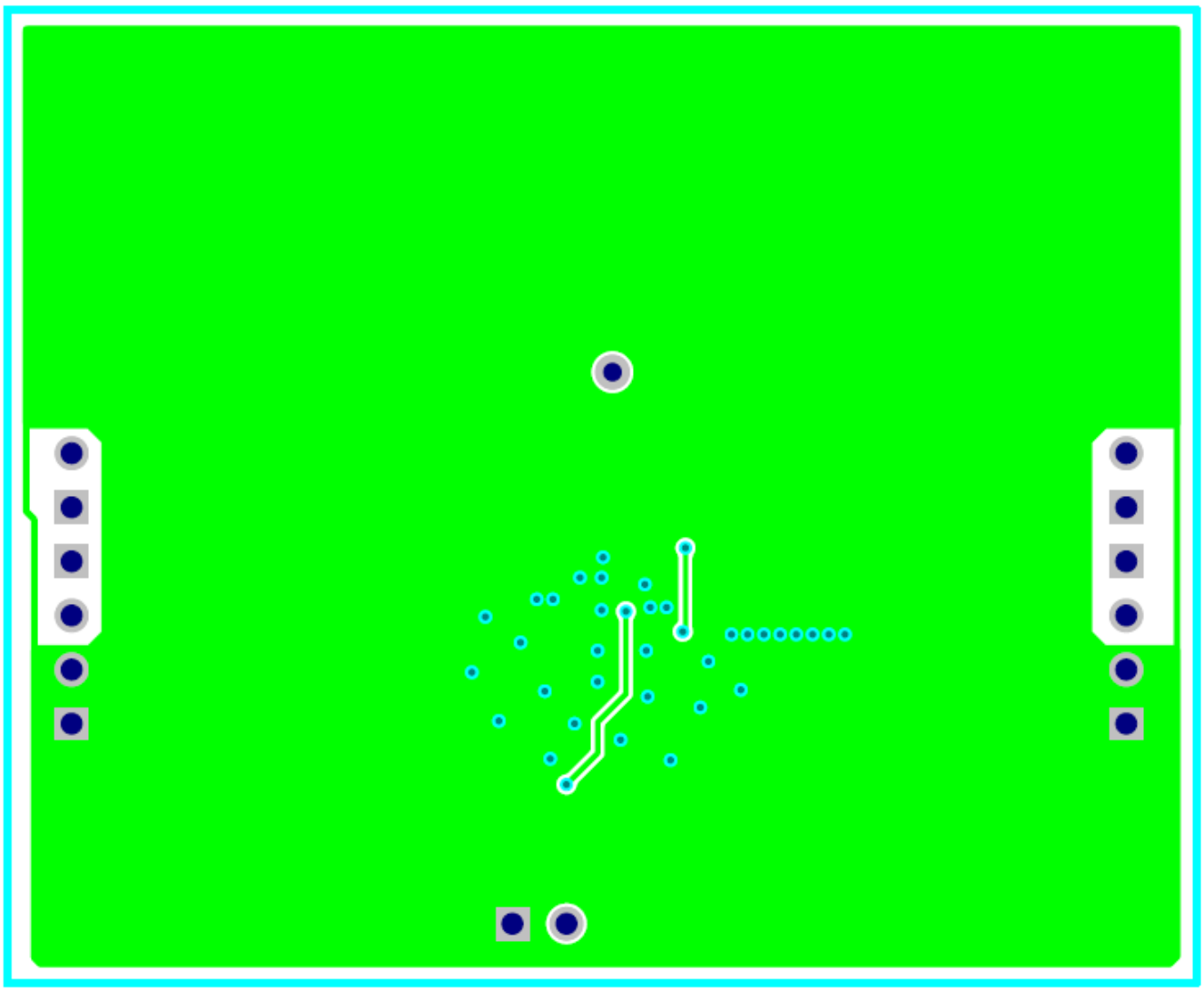

Figure 5. Bottom Layer

5 Schematic and Bill of Materials

This section provides the TLV62566-PWR232 schematic and BOM.

5.1 Schematic

Figure 6 illustrates the EVM schematic.

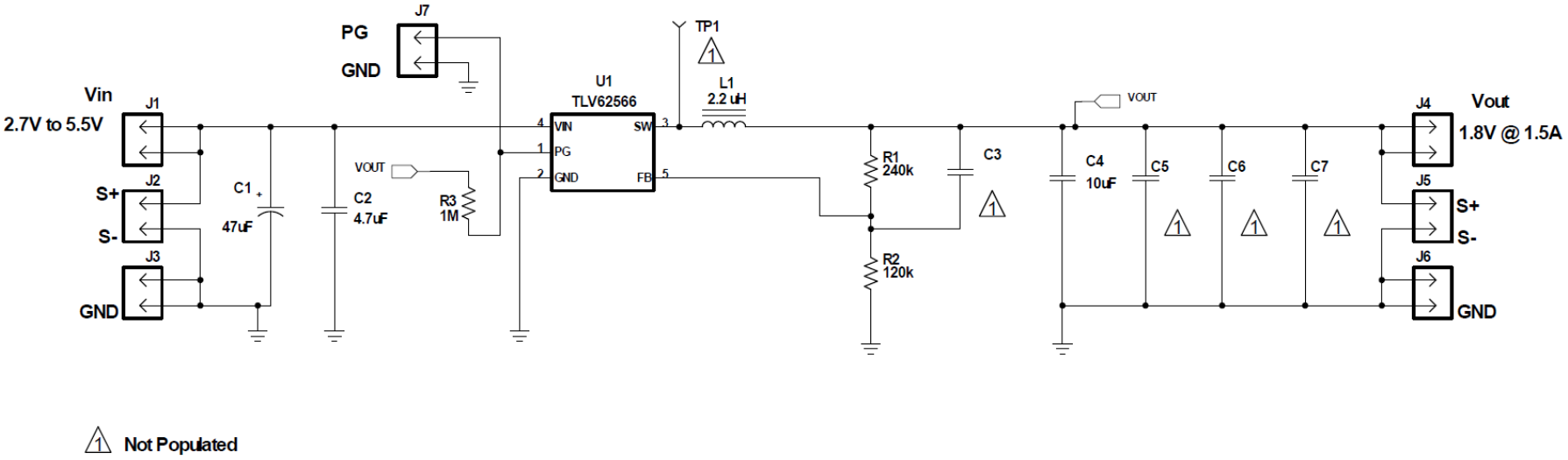

Figure 6. TLV62566-PWR232 Schematic

5.2 Bill of Materials

Table 2. TLV62566-PWR232 Bill of Materials

Qty	RefDes	Value	Description	Size	Part Number	MFR
1	C1	47uF	Capacitor, Tantalum, 8V, 35milliohm, 20%	3528(B)	T520B476M008ATE035	KEMET
1	C2	4.7uF	Capacitor, Ceramic Chip, 6.3V, X5R, ±20%	0603	GRM188R60J475ME84	Murata
1	C4	10uF	Capacitor, Ceramic Chip, 6.3V, X5R, ±20%	0603	GRM188R60J106ME84	Murata
1	L1	2.2 uH	Inductor, LQH44PN_SERIES, ± 20%	1515	LQH44PN2R2MP0	Murata
2	R1	240k	Resistor, Chip, 1/10W, 1%	0603	MCR03ERTF2403	Rohm
1	R2	120k	Resistor, Chip, 1/10W, 1%	0603	MCR03EZPFX1203	Rohm
1	R3	1M	Resistor, Chip, 1/10W, 1%	0603	MCR03ERTF1004	Rohm
1	U1	TLV62566DBV	IC, 1.5A High Efficiency Step Down Converter	SOT-23	TLV62566DBV	TI

The TLV62566-PWR232 may be populated with TLV62566 (U1) devices that do not contain the correct top side markings on the top of the device itself. These devices are still fully-tested TLV62566 devices and meet the specified electrical characteristics of the data sheet.

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For EVMs **not** subject to the above rules, this evaluation board/kit/module is intended for use for ENGINEERING DEVELOPMENT, DEMONSTRATION OR EVALUATION PURPOSES ONLY and is not considered by TI to be a finished end product fit for general consumer use. It generates, uses, and can radiate radio frequency energy and has not been tested for compliance with the limits of computing devices pursuant to part 15 of FCC or ICES-003 rules, which are designed to provide reasonable protection against radio frequency interference. Operation of the equipment may cause interference with radio communications, in which case the user at his own expense will be required to take whatever measures may be required to correct this interference.

General Statement for EVMs including a radio

User Power/Frequency Use Obligations: This radio is intended for development/professional use only in legally allocated frequency and power limits. Any use of radio frequencies and/or power availability of this EVM and its development application(s) must comply with local laws governing radio spectrum allocation and power limits for this evaluation module. It is the user's sole responsibility to only operate this radio in legally acceptable frequency space and within legally mandated power limitations. Any exceptions to this are strictly prohibited and unauthorized by Texas Instruments unless user has obtained appropriate experimental/development licenses from local regulatory authorities, which is responsibility of user including its acceptable authorization.

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

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

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.

For EVMs annotated as IC – INDUSTRY CANADA Compliant

This Class A or B digital apparatus complies with Canadian ICES-003.

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

Concerning EVMs including radio transmitters

This device complies with Industry Canada licence-exempt RSS standard(s). 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.

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.

Cet appareil numérique de la classe A ou B est conforme à la norme NMB-003 du Canada.

Les changements ou les modifications pas expressément approuvés par la partie responsable de la conformité ont pu vider l'autorité de l'utilisateur pour actionner l'équipement.

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.

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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This development kit is NOT certified as Confirming to Technical Regulations of Radio Law of Japan

If you use this product in Japan, you are required by Radio Law of Japan to follow the instructions below with respect to this product:

1. Use this product 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 this product only after you obtained the license of Test Radio Station as provided in Radio Law of Japan with respect to this product, or
3. Use of this product only after you obtained the Technical Regulations Conformity Certification as provided in Radio Law of Japan with respect to this product. Also, please do not transfer this product, unless you give the same notice above to the transferee. Please note that if you could not follow the instructions above, you will be subject to penalties of Radio Law of Japan.

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