

TLV61220 采用薄型 SOT-23 封装的低输入电压升压转换器

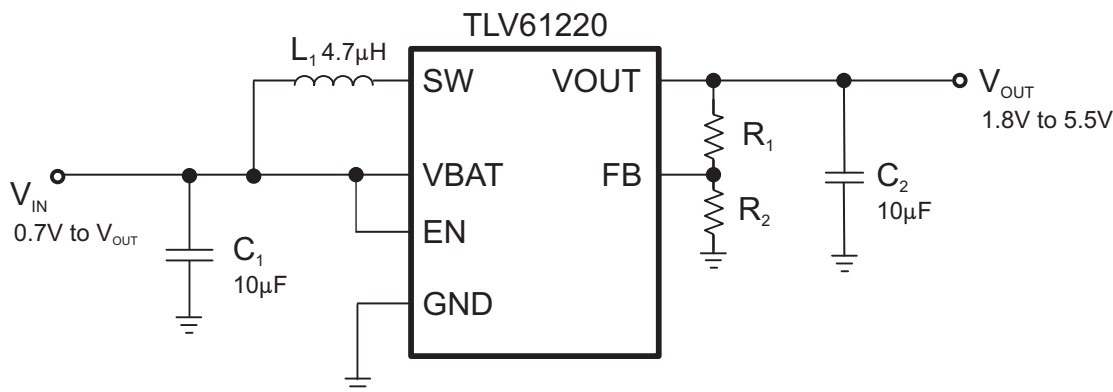
1 特性

- 在典型工作条件下效率高达 95%
- 5.5 μ A 静态电流
- 负载的启动输入电压为 0.7V
- 运行输入电压范围为 0.7V 至 5.5V
- 停机期间具有导通功能
- 最小开关电流为 200mA
- 保护特性：
 - 输出过压
 - 过热
 - 输入欠压闭锁
- 可调节输出电压范围为 1.8V 至 5.5V
- 小型 6 引脚超薄小外形尺寸晶体管 (SOT)-23 封装

2 应用范围

- 电池供电类 应用
 - 1 至 3 节碱性电池、镍镉电池 (NiCd) 或者镍氢电池 (NiMH)
 - 1 节锂离子或者锂离子一次性电池
- 太阳能或燃料电池供电 应用
- 消费类及便携式医疗产品
- 个人护理产品
- 白色或者状态发光二极管 (LED)
- 智能电话

4 典型应用电路原理图



3 说明

TLV61220 器件可以由单节、2 节或 3 节碱性、镍镉或镍氢电池或单节锂离子或锂聚合物电池供电的产品提供电源解决方案。可实现的输出电流取决于输入输出电压比。升压转换器建立在采用同步整流的磁滞控制器拓扑基础之上，能够以最少的静态电流实现最高的效率。可通过一个外部电阻分压器对此可调版本的输出电压进行设定，或者可将此电压内部设定为一个固定值。此转换器可由一个特定的使能引脚关闭。关闭时，电池消耗降至最低。此器件采用一个 6 引脚超薄 SOT-23 封装 (DBV)。

器件信息(1)

器件型号	封装	封装尺寸 (标称值)
TLV61220	SOT (6)	2.90mm x 1.60mm

(1) 如需了解所有可用封装，请见数据表末尾的可订购产品附录。



目录

1	特性	1	10.2	Functional Block Diagram	10
2	应用范围.....	1	10.3	Feature Description.....	10
3	说明.....	1	10.4	Device Functional Modes.....	11
4	典型应用电路原理图.....	1	11	Application and Implementation.....	12
5	修订历史记录	2	11.1	Application Information.....	12
6	Device Options.....	3	11.2	Typical Application	12
7	Pin Configuration and Functions	3	12	Power Supply Recommendations	16
8	Specifications.....	4	13	Layout.....	16
8.1	Absolute Maximum Ratings	4	13.1	Layout Guidelines	16
8.2	ESD Ratings.....	4	13.2	Layout Example	16
8.3	Recommended Operating Conditions.....	4	13.3	Thermal Considerations	16
8.4	Thermal Information	4	14	器件和文档支持	17
8.5	Electrical Characteristics.....	5	14.1	器件支持	17
8.6	Typical Characteristics.....	6	14.2	文档支持	17
9	Parameter Measurement Information	9	14.3	商标	17
10	Detailed Description	10	14.4	静电放电警告.....	17
10.1	Overview	10	14.5	术语表	17
			15	机械、封装和可订购信息.....	17

5 修订历史记录

Changes from Original (May 2012) to Revision A

Page

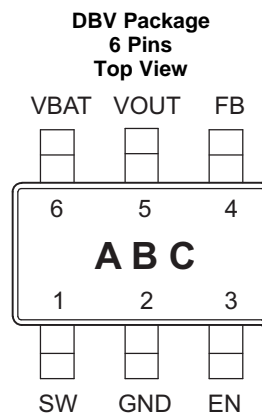
- 已添加 *ESD* 额定值表, 特性 描述部分, 器件功能模式, 应用和实施部分, 电源相关建议部分, 布局部分, 器件和文档支持部分以及机械、封装和可订购信息部分

1

6 Device Options

T_A	OUTPUT VOLTAGE DC/DC	PACKAGE	PART NUMBER
–40°C to 85°C	Adjustable	6-Pin SOT-23	TLV61220DBV

7 Pin Configuration and Functions



Pin Functions

PIN		I/O	DESCRIPTION
NAME	NO.		
EN	3	I	Enable input (VBAT enabled, GND disabled)
FB	4	I	Voltage feedback for programming the output voltage
GND	2	—	IC ground connection for logic and power
SW	1	I	Boost and rectifying switch input
VBAT	6	I	Supply voltage
VOUT	5	O	Boost converter output

8 Specifications

8.1 Absolute Maximum Ratings

over operating free-air temperature range (unless otherwise noted) ⁽¹⁾

		MIN	MAX	UNIT
V _{IN}	Input voltage on VBAT, SW, VOUT, EN, FB	-0.3	7.5	V
T _J	Operating junction temperature	-40	150	°C
T _{stg}	Storage temperature	-65	150	°C

- (1) Stresses beyond those listed under *Absolute Maximum Ratings* may cause permanent damage to the device. These are stress ratings only, which do not imply functional operation of the device at these or any other conditions beyond those indicated under *Recommended Operating Conditions*. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

8.2 ESD Ratings

		VALUE	UNIT
V _(ESD)	Electrostatic discharge	Human-body model (HBM), per ANSI/ESDA/JEDEC JS-001 ⁽¹⁾	±2000
		Charged-device model (CDM), per JEDEC specification JESD22-C101 ⁽²⁾	±1500

- (1) JEDEC document JEP155 states that 500-V HBM allows safe manufacturing with a standard ESD control process.
 (2) JEDEC document JEP157 states that 250-V CDM allows safe manufacturing with a standard ESD control process.

8.3 Recommended Operating Conditions

		MIN	NOM	MAX	UNIT
V _{IN}	Supply voltage at VIN	0.7		5.5	V
T _A	Operating free air temperature range	-40		85	°C
T _J	Operating virtual junction temperature range	-40		125	°C

8.4 Thermal Information

THERMAL METRIC ⁽¹⁾	TLV61220	UNIT	
	DBV		
	6 PINS		
R _{θJA}	Junction-to-ambient thermal resistance	185.7	°C/W
R _{θJC(top)}	Junction-to-case (top) thermal resistance	124.3	
R _{θJB}	Junction-to-board thermal resistance	31.3	
ψ _{JT}	Junction-to-top characterization parameter	22.9	
ψ _{JB}	Junction-to-board characterization parameter	30.8	
R _{θJC(bot)}	Junction-to-case (bottom) thermal resistance	N/A	

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

8.5 Electrical Characteristics

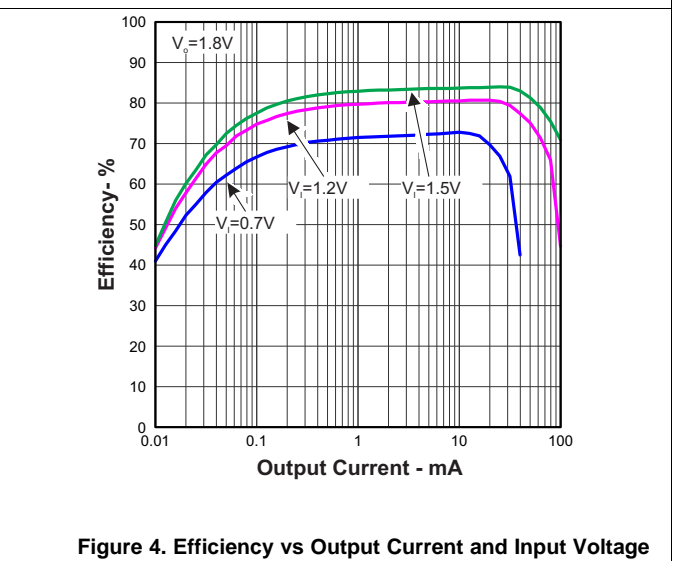
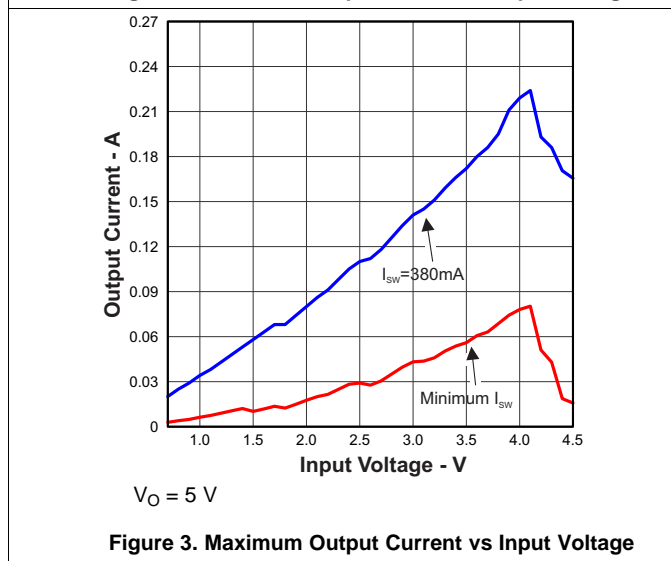
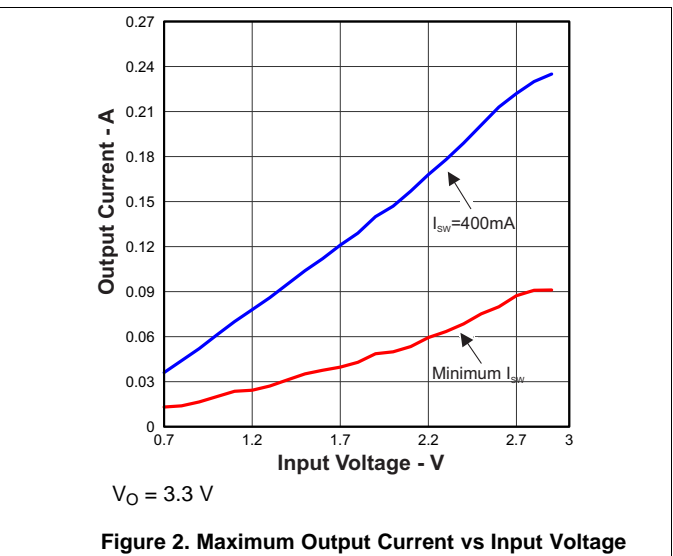
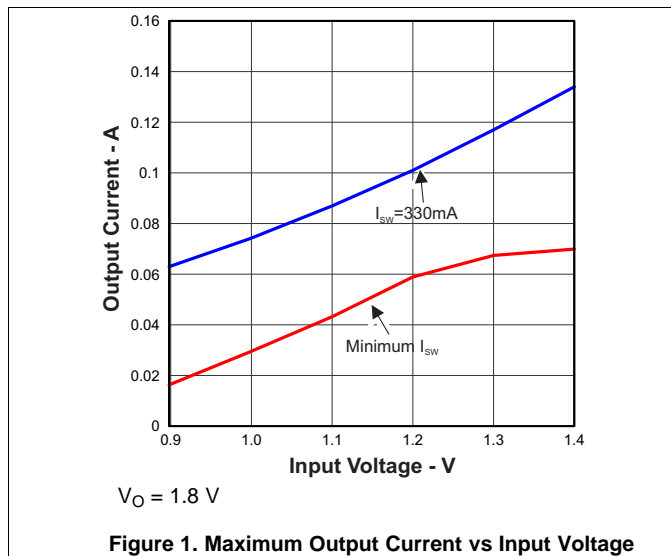
over recommended free-air temperature range and over recommended input voltage range (typical at an ambient temperature range of 25°C) (unless otherwise noted)

PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT
DC/DC STAGE						
V_{IN}	Input voltage range		0.7		5.5	V
V_{IN}	Minimum input voltage at startup	$R_{Load} \geq 150 \Omega$			0.7	V
V_{OUT}	TLV61220 output voltage range	$V_{IN} < V_{OUT}$	1.8		5.5	V
V_{FB}	TLV61220 feedback voltage		483	500	513	mV
I_{LH}	Inductor current ripple			200		mA
I_{SW}	switch current limit	$V_{OUT} = 3.3 \text{ V}, V_{IN} = 1.2 \text{ V}, T_A = 25 \text{ }^\circ\text{C}$	220	400		mA
		$V_{OUT} = 3.3 \text{ V}, T_A = -40^\circ\text{C to } 85 \text{ }^\circ\text{C}$	180	400		mA
		$V_{OUT} = 3.3 \text{ V}, T_A = 0^\circ\text{C to } 85 \text{ }^\circ\text{C}$	200	400		mA
$R_{DS(on)}$	Rectifying switch on resistance, HSD	$V_{OUT} = 3.3 \text{ V}$		1000		m Ω
		$V_{OUT} = 5 \text{ V}$		700		m Ω
	Main switch on resistance, LSD	$V_{OUT} = 3.3 \text{ V}$		600		m Ω
		$V_{OUT} = 5 \text{ V}$		550		m Ω
	Line regulation	$V_{IN} < V_{OUT}$		0.5%		
	Load regulation	$V_{IN} < V_{OUT}$		0.5%		
I_Q	Quiescent current	V_{IN}	$I_O = 0 \text{ mA}, V_{EN} = V_{IN} = 1.2 \text{ V}, V_{OUT} = 3.3 \text{ V}$	0.5	0.9	μA
		V_{OUT}		5	7.5	μA
I_{SD}	Shutdown current	V_{IN}	$V_{EN} = 0 \text{ V}, V_{IN} = 1.2 \text{ V}, V_{OUT} \geq V_{IN}$	0.2	0.5	μA
I_{LKG}	Leakage current into VOUT		$V_{EN} = 0 \text{ V}, V_{IN} = 1.2 \text{ V}, V_{OUT} = 3.3 \text{ V}$	1		μA
	Leakage current into SW		$V_{EN} = 0 \text{ V}, V_{IN} = 1.2 \text{ V}, V_{SW} = 1.2 \text{ V}, V_{OUT} \geq V_{IN}$	0.01	0.2	μA
I_{FB}	TLV61220 Feedback input current		$V_{FB} = 0.5 \text{ V}$	0.01		μA
I_{EN}	EN input current		Clamped on GND or V_{IN} ($V_{IN} < 1.5 \text{ V}$)	0.005	0.1	μA
CONTROL STAGE						
V_{IL}	EN input low voltage	$V_{IN} \leq 1.5 \text{ V}$			$0.2 \times V_{IN}$	V
V_{IH}	EN input high voltage	$V_{IN} \leq 1.5 \text{ V}$	$0.8 \times V_{IN}$			V
V_{IL}	EN input low voltage	$5 \text{ V} > V_{IN} > 1.5 \text{ V}$			0.4	V
V_{IH}	EN input high voltage	$5 \text{ V} > V_{IN} > 1.5 \text{ V}$	1.2			V
V_{UVLO}	Undervoltage lockout threshold for turn off	V_{IN} decreasing		0.5	0.7	V
	Overvoltage protection threshold		5.5		7.5	V
	Overtemperature protection			140		$^\circ\text{C}$
	Overtemperature hysteresis			20		$^\circ\text{C}$

8.6 Typical Characteristics

Table 1. Table of Graphs

		FIGURE
Output Current	Input Voltage, $I_{SW} = 330\text{ mA}$, Minimum $I_{SW} = 200\text{ mA}$, $V_O = 1.8\text{ V}$	Figure 1
	Input Voltage, $I_{SW} = 400\text{ mA}$, Minimum $I_{SW} = 200\text{ mA}$, $V_O = 3.3\text{ V}$	Figure 2
	Input Voltage, $I_{SW} = 380\text{ mA}$, Minimum $I_{SW} = 200\text{ mA}$, $V_O = 5\text{ V}$	Figure 3
Efficiency	vs Output Current, $V_O = 1.8\text{ V}$, $V_I = [0.7\text{ V}; 1.2\text{ V}; 1.5\text{ V}]$	Figure 4
	vs Output Current, $V_O = 3.3\text{ V}$, $V_I = [0.7\text{ V}; 1.2\text{ V}; 2.4\text{ V}; 3\text{ V}]$	Figure 5
	vs Output Current, $V_O = 5\text{ V}$, $V_I = [0.7\text{ V}; 1.2\text{ V}; 3.6\text{ V}; 4.2\text{ V}]$	Figure 6
Efficiency	vs Input Voltage, $V_O = 1.8\text{ V}$, $I_O = [100\mu\text{A}; 1\text{ mA}; 10\text{ mA}; 50\text{ mA}]$	Figure 7
	vs Input Voltage, $V_O = 3.3\text{ V}$, $I_O = [100\mu\text{A}; 1\text{ mA}; 10\text{ mA}; 50\text{ mA}]$	Figure 8
	vs Input Voltage, $V_O = 5\text{ V}$, $I_O = [100\mu\text{A}; 1\text{ mA}; 10\text{ mA}; 50\text{ mA}]$	Figure 9
Output Voltage	vs Output Current, $V_O = 1.8\text{ V}$, $V_I = [0.7\text{ V}; 1.2\text{ V}]$	Figure 10
	vs Output Current, $V_O = 3.3\text{ V}$, $V_I = [0.7\text{ V}; 1.2\text{ V}; 2.4\text{ V}]$	Figure 11



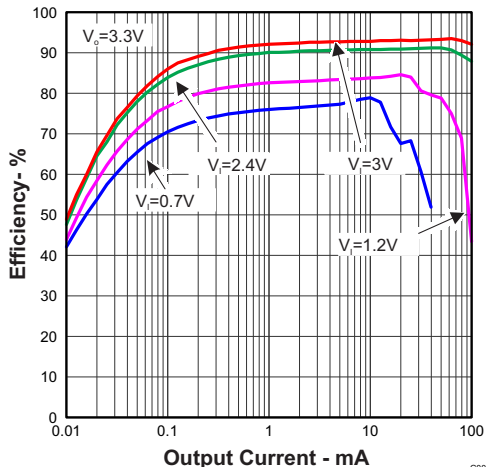


Figure 5. Efficiency vs Output Current and Input Voltage

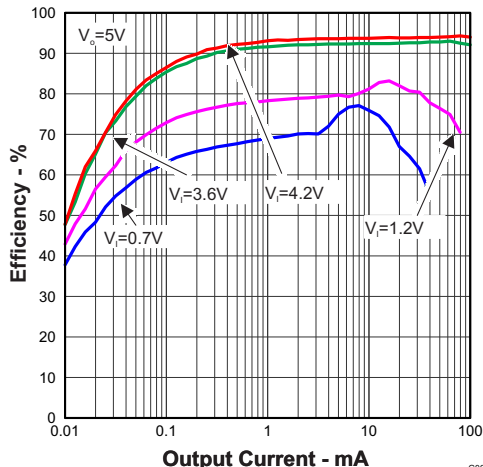


Figure 6. Efficiency vs Input Voltage and Output Current

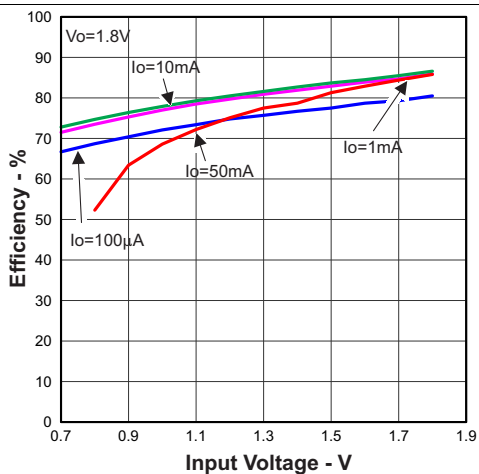


Figure 7. Efficiency vs Input Voltage and Output Current

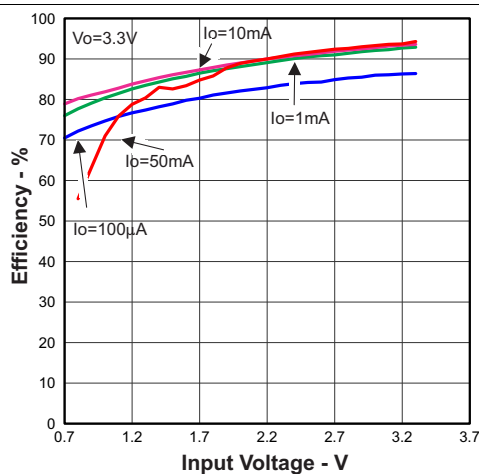


Figure 8. Efficiency vs Input Voltage and Output Current

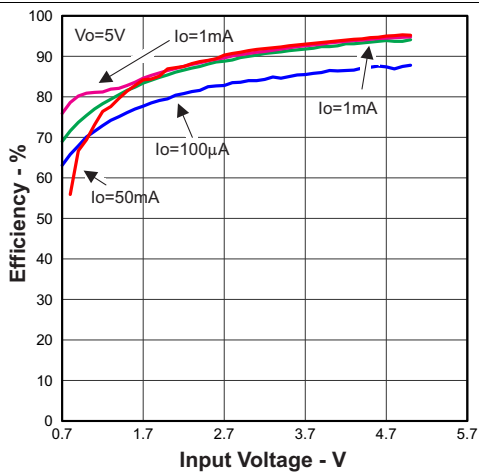


Figure 9. Efficiency vs Input Voltage and Output Current

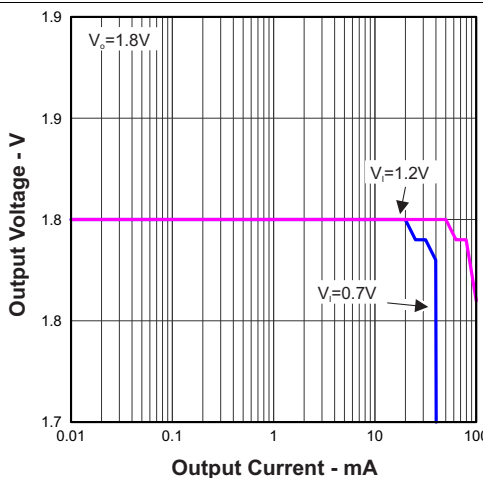


Figure 10. Output Voltage vs Output Current and Input Voltage

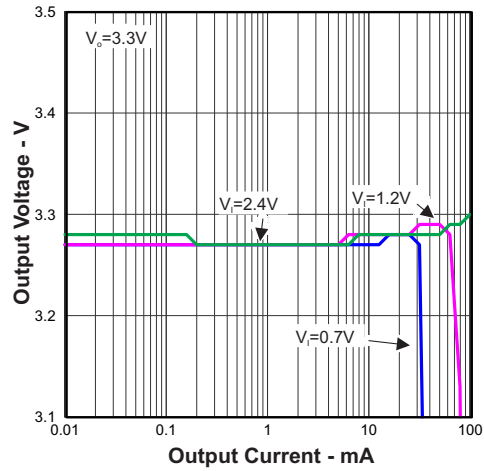


Figure 11. Output Voltage vs Output Current and Input Voltage

9 Parameter Measurement Information

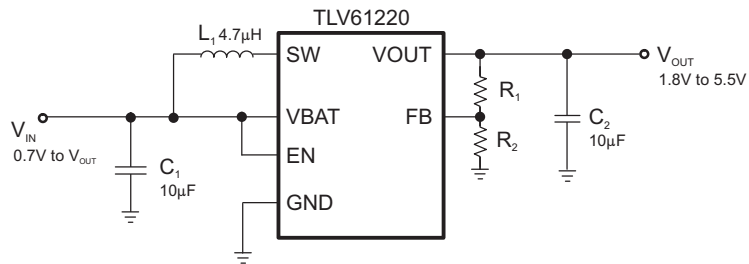


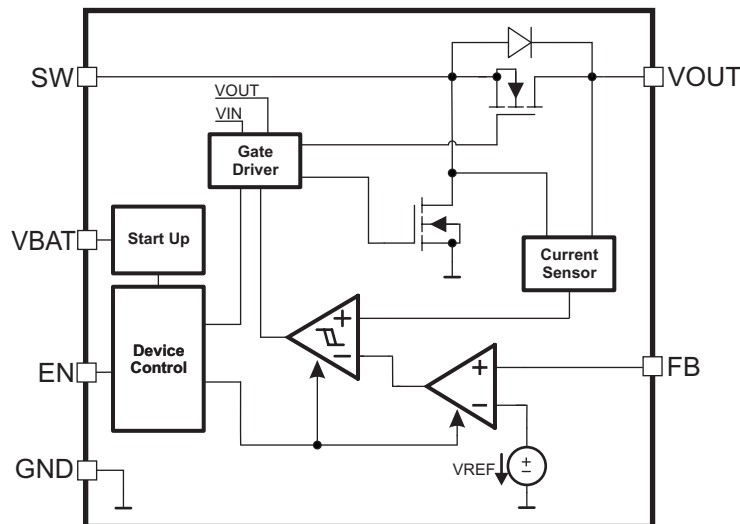
Figure 12. Parameter Measurement Schematic

10 Detailed Description

10.1 Overview

The TLV61220 is a high performance, highly efficient boost converter. To achieve high efficiency the power stage is realized as a synchronous boost topology. For the power switching two actively controlled low $R_{DS(on)}$ power MOSFETs are implemented.

10.2 Functional Block Diagram



10.3 Feature Description

10.3.1 Controller Circuit

The device is controlled by a hysteretic current mode controller. This controller regulates the output voltage by keeping the inductor ripple current constant in the range of 200 mA and adjusting the offset of this inductor current depending on the output load. In case the required average input current is lower than the average inductor current defined by this constant ripple the inductor current gets discontinuous to keep the efficiency high at low load conditions.

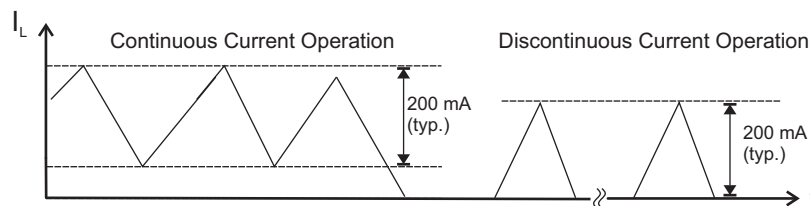


Figure 13. Hysteretic Current Operation

The output voltage V_{OUT} is monitored via the feedback network which is connected to the voltage error amplifier. To regulate the output voltage, the voltage error amplifier compares this feedback voltage to the internal voltage reference and adjusts the required offset of the inductor current accordingly. An external resistor divider needs to be connected.

The self oscillating hysteretic current mode architecture is inherently stable and allows fast response to load variations. It also allows using inductors and capacitors over a wide value range.

Feature Description (continued)

10.3.1.1 Startup

After the EN pin is tied high, the device starts to operate. In case the input voltage is not high enough to supply the control circuit properly a startup oscillator starts to operate the switches. During this phase the switching frequency is controlled by the oscillator and the maximum switch current is limited. As soon as the device has built up the output voltage to about 1.8 V, high enough for supplying the control circuit, the device switches to its normal hysteretic current mode operation. The startup time depends on input voltage and load current.

10.3.1.2 Operation at Output Overload

If in normal boost operation the inductor current reaches the internal switch current limit threshold the main switch is turned off to stop further increase of the input current.

In this case the output voltage will decrease since the device can not provide sufficient power to maintain the set output voltage.

If the output voltage drops below the input voltage the backgate diode of the rectifying switch gets forward biased and current starts flow through it. This diode cannot be turned off, so the current finally is only limited by the remaining DC resistances. As soon as the overload condition is removed, the converter resumes providing the set output voltage.

10.3.1.3 Undervoltage Lockout

An implemented undervoltage lockout function stops the operation of the converter if the input voltage drops below the typical undervoltage lockout threshold. This function is implemented in order to prevent malfunctioning of the converter.

10.3.1.4 Overvoltage Protection

If, for any reason, the output voltage is not fed back properly to the input of the voltage amplifier, control of the output voltage will not work anymore. Therefore an overvoltage protection is implemented to avoid the output voltage exceeding critical values for the device and possibly for the system it is supplying. For this protection the TLV61220 output voltage is also monitored internally. In case it reaches the internally programmed threshold of 6.5 V typically the voltage amplifier regulates the output voltage to this value.

If the TLV61220 is used to drive LEDs, this feature protects the circuit if the LED fails.

10.3.1.5 Overtemperature Protection

The device has a built-in temperature sensor which monitors the internal IC junction temperature. If the temperature exceeds the programmed threshold (see electrical characteristics table), the device stops operating. As soon as the IC temperature has decreased below the programmed threshold, it starts operating again. To prevent unstable operation close to the region of overtemperature threshold, a built-in hysteresis is implemented.

10.4 Device Functional Modes

10.4.1 Device Enable and Shutdown Mode

The device is enabled when EN is set high and shut down when EN is low. During shutdown, the converter stops switching and all internal control circuitry is turned off. In this case the input voltage is connected to the output through the back-gate diode of the rectifying MOSFET. This means that there always will be voltage at the output which can be as high as the input voltage or lower depending on the load.

11 Application and Implementation

NOTE

Information in the following applications sections is not part of the TI component specification, and TI does not warrant its accuracy or completeness. TI's customers are responsible for determining suitability of components for their purposes. Customers should validate and test their design implementation to confirm system functionality.

11.1 Application Information

The TLV61220 is intended for systems powered by a single cell battery to up to three Alkaline, NiCd or NiMH cells with a typical terminal voltage between 0.7 V and 5.5 V. It can also be used in systems powered by one-cell Li-Ion or Li-Polymer batteries with a typical voltage between 2.5 V and 4.2 V. Additionally, any other voltage source with a typical output voltage between 0.7 V and 5.5 V can be used with the TLV61220.

11.2 Typical Application

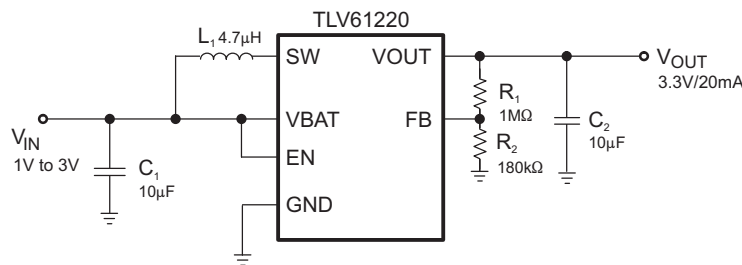


Figure 14. Typical Application Circuit for Adjustable Output Voltage Option

11.2.1 Design Requirements

In this example, TLV61220 is used to design a 3.3-V power supply with up to 50-mA output current capability. The TLV61220 can be powered by a single-cell battery to up to three Alkaline, NiCd or NiMH cells with a typical terminal voltage between 0.7 V and 5.5 V. It can also be used in systems powered by one-cell Li-Ion or Li-Polymer batteries with a typical voltage between 2.5 V and 4.2 V. In this example, the input voltage range is from 2 V to 3 V for one-cell coin cell battery input design.

Table 2. TLV61220 3.3 V Output Design Requirements

PARAMETERS	VALUES
Input Voltage	2 V to 3 V
Output Voltage	3.3 V
Output Current	50 mA

11.2.2 Detailed Design Procedure

Table 3. List of Components

COMPONENT REFERENCE	PART NUMBER	MANUFACTURER	VALUE
C ₁	GRM188R60J106ME84D	Murata	10 µF, 6.3V. X5R Ceramic
C ₂	GRM188R60J106ME84D	Murata	10 µF, 6.3V. X5R Ceramic
L ₁	1269AS-H-4ZR7N	Toko	4.7 µH
R ₁ , R ₂			R ₁ = 1MΩ, R ₂ = Values depending on the programmed output voltage

11.2.2.1 Adjustable Output Voltage Version

An external resistor divider is used to adjust the output voltage. The resistor divider needs to be connected between VOUT, FB and GND as shown in [Figure 14](#). When the output voltage is regulated properly, the typical voltage value at the FB pin is 500 mV. The maximum recommended value for the output voltage is 5.5 V. The current through the resistive divider should be about 100 times greater than the current into the FB pin. The typical current into the FB pin is 0.01 μA, and the voltage across the resistor between FB and GND, R₂, is typically 500 mV. Based on those two values, the recommended value for R₂ should be lower than 500 kΩ, in order to set the divider current to 1 μA or higher. The value of the resistor connected between VOUT and FB, R₁, depending on the needed output voltage (V_{OUT}), can be calculated using [Equation 1](#):

$$R_1 = R_2 \times \left(\frac{V_{OUT}}{V_{FB}} - 1 \right) \quad (1)$$

As an example, if an output voltage of 3.3 V is needed, a 1-MΩ resistor is calculated for R₁ when for R₂ a 180-kΩ has been selected.

11.2.2.2 Inductor Selection

To make sure that the TLV61220 can operate, a suitable inductor must be connected between pin VBAT and pin SW. Inductor values of 4.7 μH show good performance over the whole input and output voltage range .

Choosing other inductance values affects the switching frequency *f* proportional to 1/L as shown in [Equation 2](#).

$$L = \frac{1}{f \times 200 \text{ mA}} \times \frac{V_{IN} \times (V_{OUT} - V_{IN})}{V_{OUT}} \quad (2)$$

Choosing inductor values higher than 4.7 μH can improve efficiency due to reduced switching frequency and, therefore, with reduced switching losses. Using inductor values below 2.2 μH is not recommended.

Having selected an inductance value, the peak current for the inductor in steady state operation can be calculated. [Equation 3](#) gives the peak current estimate.

$$I_{L,MAX} = \begin{cases} \frac{V_{OUT} \times I_{OUT}}{0.8 \times V_{IN}} + 100 \text{ mA}; & \text{continuous current operation} \\ 200 \text{ mA}; & \text{discontinuous current operation} \end{cases} \quad (3)$$

For selecting the inductor this would be the suitable value for the current rating. It also needs to be taken into account that load transients and error conditions may cause higher inductor currents.

[Equation 4](#) helps to estimate whether the device will work in continuous or discontinuous operation depending on the operating points. As long as the inequation is true, continuous operation is typically established. If the inequation becomes false, discontinuous operation is typically established.

$$\frac{V_{OUT} \times I_{OUT}}{V_{IN}} > 0.8 \times 100 \text{ mA} \quad (4)$$

The following inductor series from different suppliers have been used with TLV61220 converters:

Table 4. List of Inductors

VENDOR	INDUCTOR SERIES
Toko	DFE252010C
Coilcraft	EPL3015
	EPL2010
Murata	LQH3NP
Taiyo Yuden	NR3015
Würth Elektronik	WE-TPC Typ S

11.2.2.3 Capacitor Selection

11.2.2.3.1 Input Capacitor

At least a 10- μ F input capacitor is recommended to improve transient behavior of the regulator and EMI behavior of the total power supply circuit. A ceramic capacitor placed as close as possible to the VBAT and GND pins of the IC is recommended.

11.2.2.3.2 Output Capacitor

For the output capacitor C_2 , it is recommended to use small ceramic capacitors placed as close as possible to the VOUT and GND pins of the IC. If, for any reason, the application requires the use of large capacitors which can not be placed close to the IC, the use of a small ceramic capacitor with an capacitance value of around 2.2 μ F in parallel to the large one is recommended. This small capacitor should be placed as close as possible to the VOUT and GND pins of the IC.

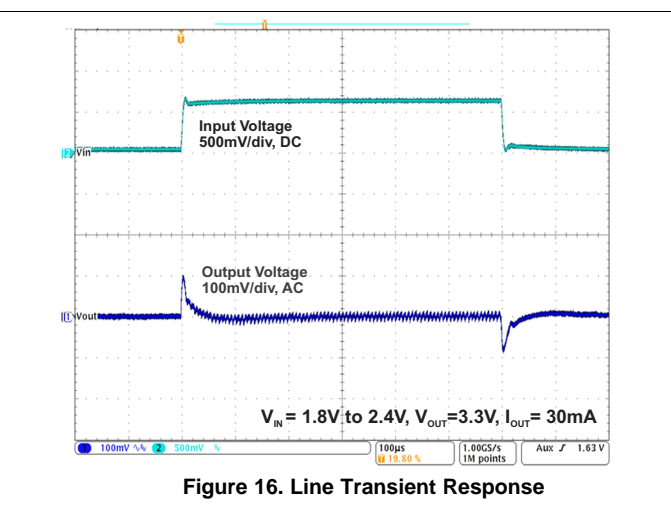
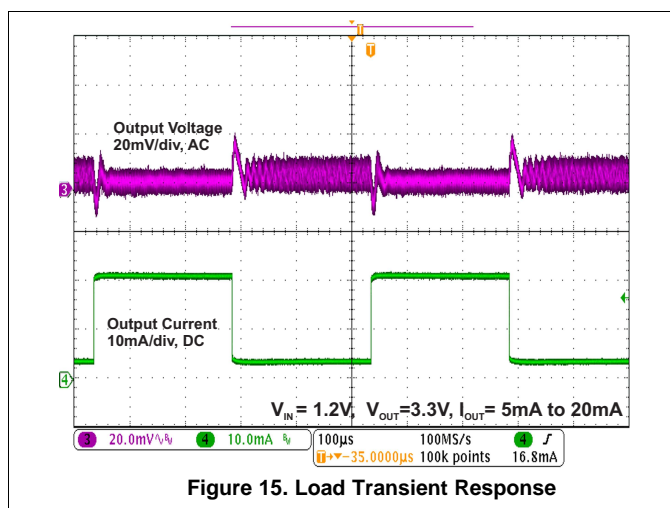
A minimum capacitance value of 4.7 μ F should be used, 10 μ F are recommended. If the inductor value exceeds 4.7 μ H, the value of the output capacitance value needs to be half the inductance value or higher for stability reasons, see [Equation 5](#).

$$C_2 \geq \frac{L}{2} \times \frac{\mu\text{F}}{\mu\text{H}} \quad (5)$$

The TLV61220 is not sensitive to the ESR in terms of stability. Using low ESR capacitors, such as ceramic capacitors, is recommended anyway to minimize output voltage ripple. If heavy load changes are expected, the output capacitor value should be increased to avoid output voltage drops during fast load transients.

11.2.3 Application Curves

	FIGURE
Load transient, $V_I = 1.2\text{ V}$, $V_O = 3.3\text{ V}$, $I_O = 5\text{ mA}$ to 20 mA	Figure 15
Line transient, $V_I = 1.8\text{ V}$ to 2.4 V , $V_O = 3.3\text{ V}$, $I_O = 30\text{ mA}$	Figure 16
Startup after Enable, $V_I = 1.2\text{ V}$, $V_O = 3.3\text{ V}$, $R_{\text{LOAD}} = 50\ \Omega$	Figure 17



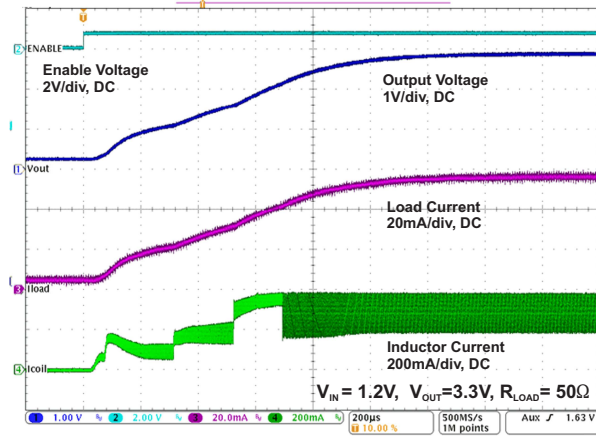


Figure 17. Start Up After Enable

12 Power Supply Recommendations

The power supply can be single-cell, two-cell, or three-cell alkaline, NiCd or NiMH, or one-cell Li-Ion or Li-polymer battery.

The input supply should be well regulated with the rating of TLV61220. If the input supply is located more than a few inches from the device, additional bulk capacitance may be required in addition to the ceramic bypass capacitors. An electrolytic or tantalum capacitor with a value of 47 μF is a typical choice.

13 Layout

13.1 Layout Guidelines

As for all switching power supplies, the layout is an important step in the design, especially at high peak currents and high switching frequencies. If the layout is not carefully done, the regulator could show stability problems as well as EMI problems. Therefore, use wide and short traces for the main current path and for the power ground paths. The input and output capacitor, as well as the inductor should be placed as close as possible to the IC.

The feedback divider should be placed as close as possible to the control ground pin of the IC. To lay out the ground, it is recommended to use short traces as well, separated from the power ground traces. This avoids ground shift problems, which can occur due to superimposition of power ground current and control ground current. Assure that the ground traces are connected close to the device GND pin.

13.2 Layout Example

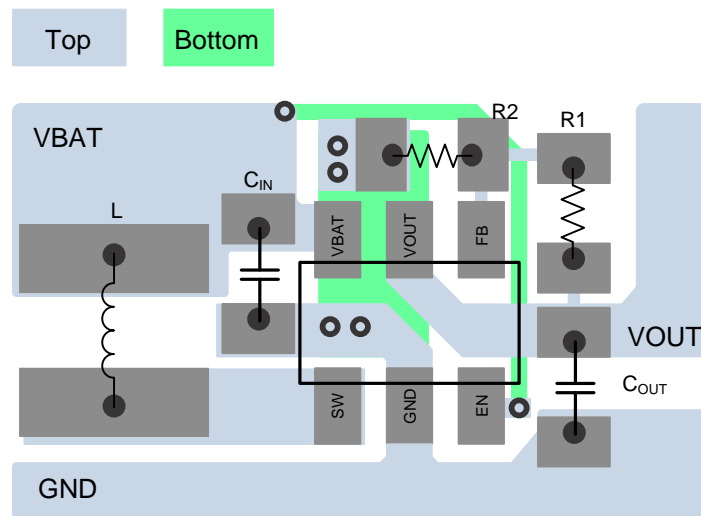


Figure 18. PCB Layout Recommendation

13.3 Thermal Considerations

Implementation of integrated circuits in low-profile and fine-pitch surface-mount packages typically requires special attention to power dissipation. Many system-dependent issues such as thermal coupling, airflow, added heat sinks and convection surfaces, and the presence of other heat-generating components affect the power-dissipation limits of a given component.

Three basic approaches for enhancing thermal performance are listed below.

- Improving the power-dissipation capability of the PCB design
- Improving the thermal coupling of the component to the PCB
- Introducing airflow in the system

For more details on how to use the thermal parameters in the dissipation ratings table please check the [Thermal Characteristics Application Note \(SZZA017\)](#) and the [IC Package Thermal Metrics Application Note \(SPRA953\)](#).

14 器件和文档支持

14.1 器件支持

14.1.1 第三方产品免责声明

TI 发布的与第三方产品或服务有关的信息，不能构成与此类产品或服务或保修的适用性有关的认可，不能构成此类产品或服务单独或与任何 TI 产品或服务一起的表示或认可。

14.2 文档支持

14.2.1 相关文档

相关文档请参见以下部分：

- 《散热特性数据应用手册》，[SZZA017](#)
- 应用手册《IC 封装热指标》（文献编号：[SPRA953](#)）

14.3 商标

All trademarks are the property of their respective owners.

14.4 静电放电警告



这些装置包含有限的内置 ESD 保护。存储或装卸时，应将导线一起截短或将装置放置于导电泡棉中，以防止 MOS 门极遭受静电损伤。

14.5 术语表

[SLYZ022](#) — TI 术语表。

这份术语表列出并解释术语、首字母缩略词和定义。

15 机械、封装和可订购信息

以下页中包括机械、封装和可订购信息。这些信息是针对指定器件可提供的最新数据。这些数据会在无通知且不对本文档进行修订的情况下发生改变。欲获得该数据表的浏览器版本，请查阅左侧的导航栏。

重要声明

德州仪器(TI)及其下属子公司有权根据 JESD46 最新标准,对所提供的产品和服务进行更正、修改、增强、改进或其它更改,并有权根据 JESD48 最新标准中止提供任何产品和服务。客户在下订单前应获取最新的相关信息,并验证这些信息是否完整且是最新的。所有产品的销售都遵循在订单确认时所提供的TI 销售条款与条件。

TI 保证其所销售的组件的性能符合产品销售时 TI 半导体产品销售条件与条款的适用规范。仅在 TI 保证的范围内,且 TI 认为有必要时才会使用测试或其它质量控制技术。除非适用法律做出了硬性规定,否则没有必要对每种组件的所有参数进行测试。

TI 对应用帮助或客户产品设计不承担任何义务。客户应对其使用 TI 组件的产品和应用自行负责。为尽量减小与客户产品和应用相关的风险,客户应提供充分的设计与操作安全措施。

TI 不对任何 TI 专利权、版权、屏蔽作品权或其它与使用了 TI 组件或服务的组合设备、机器或流程相关的 TI 知识产权中授予的直接或隐含权限作出任何保证或解释。TI 所发布的与第三方产品或服务有关的信息,不能构成从 TI 获得使用这些产品或服务的许可、授权、或认可。使用此类信息可能需要获得第三方的专利权或其它知识产权方面的许可,或是 TI 的专利权或其它知识产权方面的许可。

对于 TI 的产品手册或数据表中 TI 信息的重要部分,仅在没有对内容进行任何篡改且带有相关授权、条件、限制和声明的情况下才允许进行复制。TI 对此类篡改过的文件不承担任何责任或义务。复制第三方的信息可能需要服从额外的限制条件。

在转售 TI 组件或服务时,如果对该组件或服务参数的陈述与 TI 标明的参数相比存在差异或虚假成分,则会失去相关 TI 组件或服务的所有明示或暗示授权,且这是不正当的、欺诈性商业行为。TI 对任何此类虚假陈述均不承担任何责任或义务。

客户认可并同意,尽管任何应用相关信息或支持仍可能由 TI 提供,但他们将独立负责满足与其产品及其在应用中使用的 TI 产品相关的所有法律、法规和安全相关要求。客户声明并同意,他们具备制定与实施安全措施所需的全部专业技术和知识,可预见故障的危险后果、监测故障及其后果、降低有可能造成人身伤害的故障的发生机率并采取适当的补救措施。客户将全额赔偿因在此类安全关键应用中使用任何 TI 组件而对 TI 及其代理造成的任何损失。

在某些场合中,为了推进安全相关应用有可能对 TI 组件进行特别的促销。TI 的目标是利用此类组件帮助客户设计和创立其特有的可满足适用的功能安全性标准和要求的终端产品解决方案。尽管如此,此类组件仍然服从这些条款。

TI 组件未获得用于 FDA Class III (或类似的生命攸关医疗设备)的授权许可,除非各方授权官员已经达成了专门管控此类使用的特别协议。

只有那些 TI 特别注明属于军用等级或“增强型塑料”的 TI 组件才是设计或专门用于军事/航空应用或环境的。购买者认可并同意,对并非指定面向军事或航空航天用途的 TI 组件进行军事或航空航天方面的应用,其风险由客户单独承担,并且由客户独立负责满足与此类使用相关的所有法律和法规要求。

TI 已明确指定符合 ISO/TS16949 要求的产品,这些产品主要用于汽车。在任何情况下,因使用非指定产品而无法达到 ISO/TS16949 要求, TI 不承担任何责任。

	产品		应用
数字音频	www.ti.com.cn/audio	通信与电信	www.ti.com.cn/telecom
放大器和线性器件	www.ti.com.cn/amplifiers	计算机及周边	www.ti.com.cn/computer
数据转换器	www.ti.com.cn/dataconverters	消费电子	www.ti.com.cn/consumer-apps
DLP® 产品	www.dlp.com	能源	www.ti.com.cn/energy
DSP - 数字信号处理器	www.ti.com.cn/dsp	工业应用	www.ti.com.cn/industrial
时钟和计时器	www.ti.com.cn/clockandtimers	医疗电子	www.ti.com.cn/medical
接口	www.ti.com.cn/interface	安防应用	www.ti.com.cn/security
逻辑	www.ti.com.cn/logic	汽车电子	www.ti.com.cn/automotive
电源管理	www.ti.com.cn/power	视频和影像	www.ti.com.cn/video
微控制器 (MCU)	www.ti.com.cn/microcontrollers		
RFID 系统	www.ti.com.cn/rfidsys		
OMAP应用处理器	www.ti.com/omap		
无线连通性	www.ti.com.cn/wirelessconnectivity	德州仪器在线技术支持社区	www.deyisupport.com

邮寄地址: 上海市浦东新区世纪大道1568号, 中建大厦32楼邮政编码: 200122
Copyright © 2016, 德州仪器半导体技术(上海)有限公司

PACKAGING INFORMATION

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead/Ball Finish (6)	MSL Peak Temp (3)	Op Temp (°C)	Device Marking (4/5)	Samples
TLV61220DBVR	ACTIVE	SOT-23	DBV	6	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	VUAI	Samples
TLV61220DBVT	ACTIVE	SOT-23	DBV	6	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	VUAI	Samples

(1) The marketing status values are defined as follows:

ACTIVE: Product device recommended for new designs.

LIFEBUY: TI has announced that the device will be discontinued, and a lifetime-buy period is in effect.

NRND: Not recommended for new designs. Device is in production to support existing customers, but TI does not recommend using this part in a new design.

PREVIEW: Device has been announced but is not in production. Samples may or may not be available.

OBSELETE: TI has discontinued the production of the device.

(2) Eco Plan - The planned eco-friendly classification: Pb-Free (RoHS), Pb-Free (RoHS Exempt), or Green (RoHS & no Sb/Br) - please check <http://www.ti.com/productcontent> for the latest availability information and additional product content details.

TBD: The Pb-Free/Green conversion plan has not been defined.

Pb-Free (RoHS): TI's terms "Lead-Free" or "Pb-Free" mean semiconductor products that are compatible with the current RoHS requirements for all 6 substances, including the requirement that lead not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, TI Pb-Free products are suitable for use in specified lead-free processes.

Pb-Free (RoHS Exempt): This component has a RoHS exemption for either 1) lead-based flip-chip solder bumps used between the die and package, or 2) lead-based die adhesive used between the die and leadframe. The component is otherwise considered Pb-Free (RoHS compatible) as defined above.

Green (RoHS & no Sb/Br): TI defines "Green" to mean Pb-Free (RoHS compatible), and free of Bromine (Br) and Antimony (Sb) based flame retardants (Br or Sb do not exceed 0.1% by weight in homogeneous material)

(3) MSL, Peak Temp. - The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.

(4) There may be additional marking, which relates to the logo, the lot trace code information, or the environmental category on the device.

(5) Multiple Device Markings will be inside parentheses. Only one Device Marking contained in parentheses and separated by a "~" will appear on a device. If a line is indented then it is a continuation of the previous line and the two combined represent the entire Device Marking for that device.

(6) Lead/Ball Finish - Orderable Devices may have multiple material finish options. Finish options are separated by a vertical ruled line. Lead/Ball Finish values may wrap to two lines if the finish value exceeds the maximum column width.

Important Information and Disclaimer: The information provided on this page represents TI's knowledge and belief as of the date that it is provided. TI bases its knowledge and belief on information provided by third parties, and makes no representation or warranty as to the accuracy of such information. Efforts are underway to better integrate information from third parties. TI has taken and continues to take reasonable steps to provide representative and accurate information but may not have conducted destructive testing or chemical analysis on incoming materials and chemicals. TI and TI suppliers consider certain information to be proprietary, and thus CAS numbers and other limited information may not be available for release.

In no event shall TI's liability arising out of such information exceed the total purchase price of the TI part(s) at issue in this document sold by TI to Customer on an annual basis.

TAPE AND REEL INFORMATION



QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE



*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Reel Diameter (mm)	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant
TLV61220DBVR	SOT-23	DBV	6	3000	178.0	9.0	3.23	3.17	1.37	4.0	8.0	Q3
TLV61220DBVT	SOT-23	DBV	6	250	178.0	9.0	3.23	3.17	1.37	4.0	8.0	Q3

TAPE AND REEL BOX DIMENSIONS

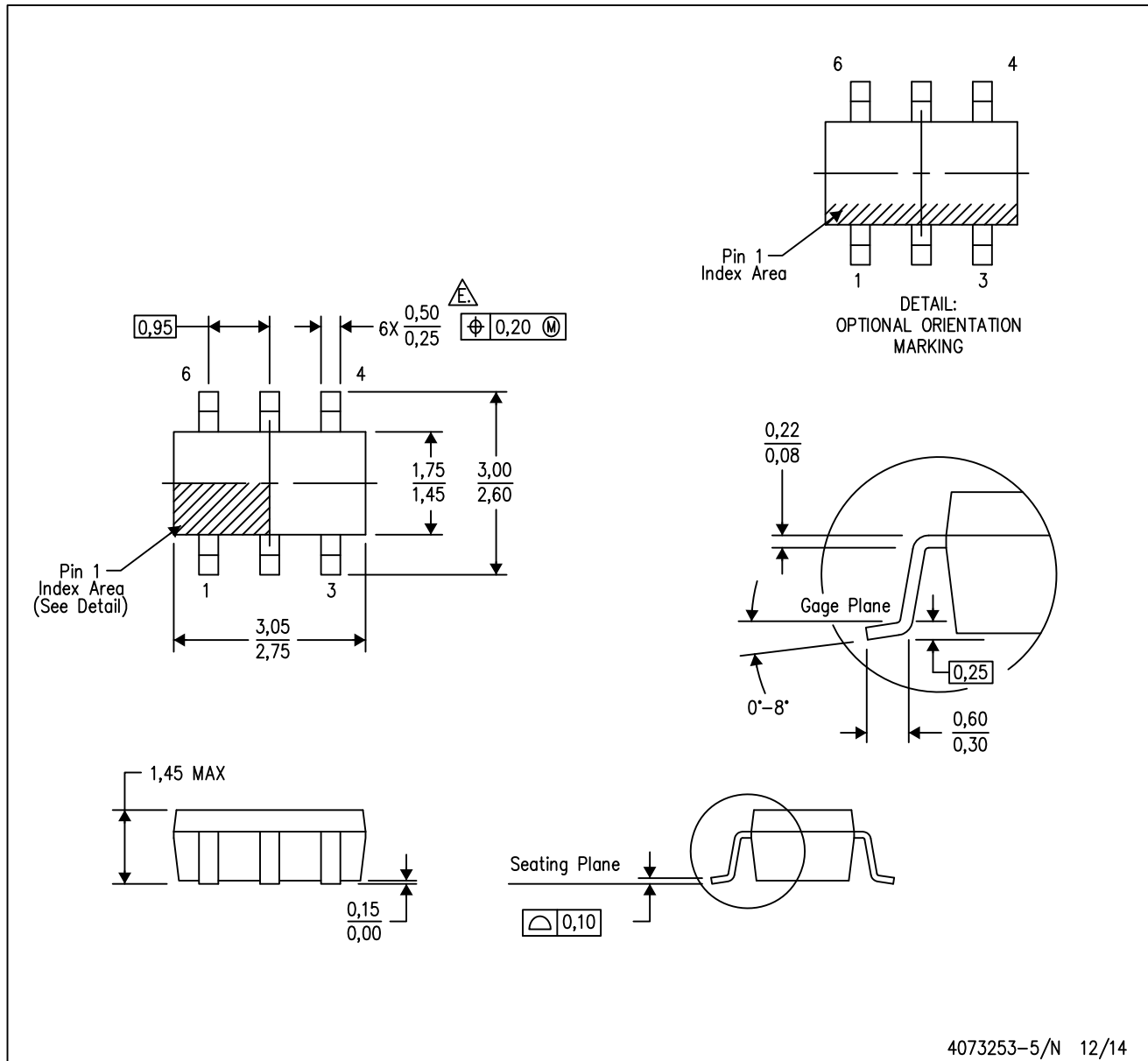

*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
TLV61220DBVR	SOT-23	DBV	6	3000	180.0	180.0	18.0
TLV61220DBVT	SOT-23	DBV	6	250	180.0	180.0	18.0

MECHANICAL DATA

DBV (R-PDSO-G6)

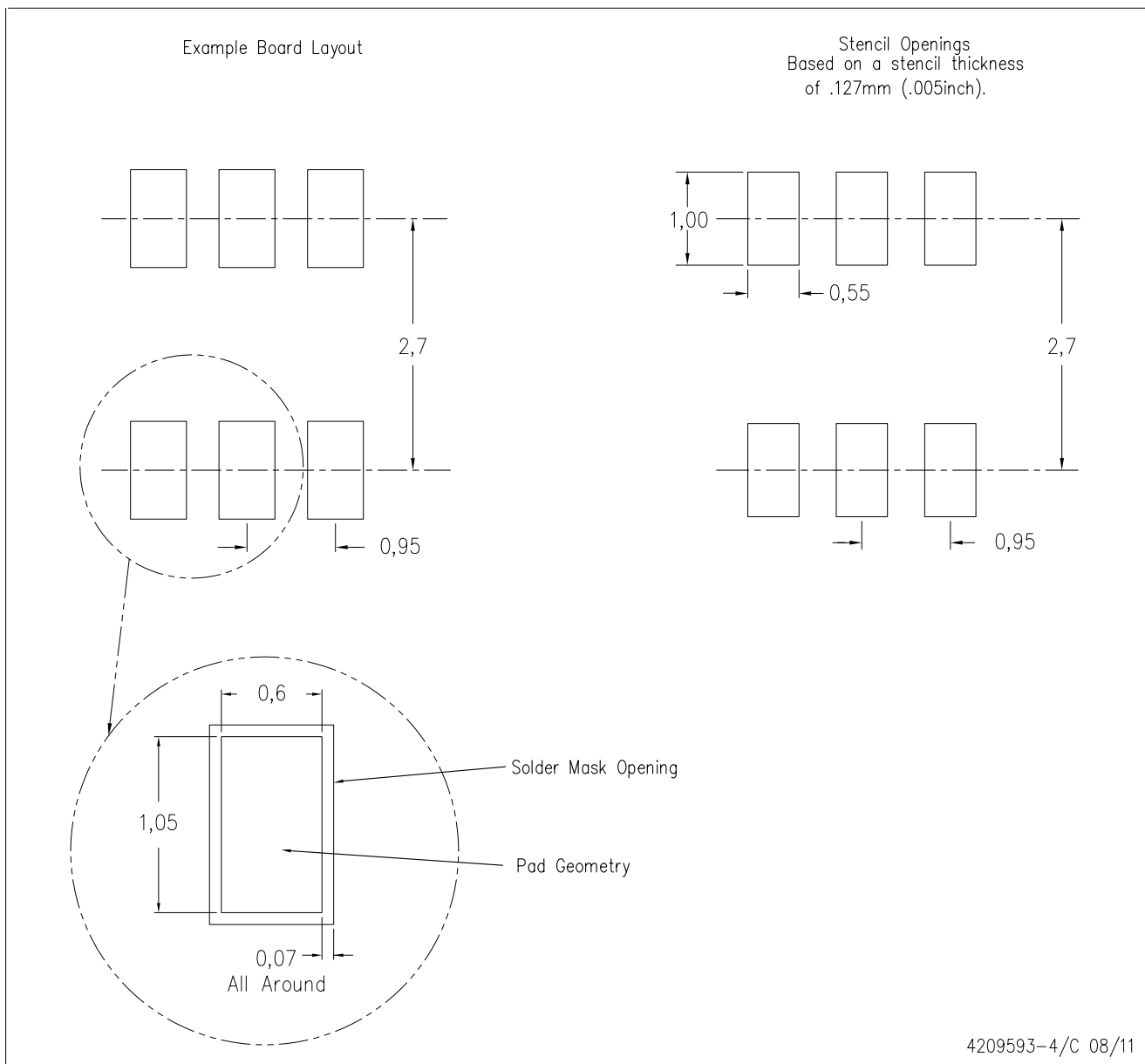
PLASTIC SMALL-OUTLINE PACKAGE



- NOTES:
- All linear dimensions are in millimeters.
 - This drawing is subject to change without notice.
 - Body dimensions do not include mold flash or protrusion. Mold flash and protrusion shall not exceed 0.15 per side.
 - Leads 1,2,3 may be wider than leads 4,5,6 for package orientation.
- Falls within JEDEC MO-178 Variation AB, except minimum lead width.

DBV (R-PDSO-G6)

PLASTIC SMALL OUTLINE



- NOTES:
- A. All linear dimensions are in millimeters.
 - B. This drawing is subject to change without notice.
 - C. Customers should place a note on the circuit board fabrication drawing not to alter the center solder mask defined pad.
 - D. Publication IPC-7351 is recommended for alternate designs.
 - E. Laser cutting apertures with trapezoidal walls and also rounding corners will offer better paste release. Customers should contact their board assembly site for stencil design recommendations. Example stencil design based on a 50% volumetric metal load solder paste. Refer to IPC-7525 for other stencil recommendations.

重要声明

德州仪器(TI) 及其下属子公司有权根据 JESD46 最新标准, 对所提供的产品和服务进行更正、修改、增强、改进或其它更改, 并有权根据 JESD48 最新标准中止提供任何产品和服务。客户在下订单前应获取最新的相关信息, 并验证这些信息是否完整且是最新的。所有产品的销售都遵循在订单确认时所提供的TI 销售条款与条件。

TI 保证其所销售的组件的性能符合产品销售时 TI 半导体产品销售条件与条款的适用规范。仅在 TI 保证的范围内, 且 TI 认为有必要时才会使用测试或其它质量控制技术。除非适用法律做出了硬性规定, 否则没有必要对每种组件的所有参数进行测试。

TI 对应用帮助或客户产品设计不承担任何义务。客户应对其使用 TI 组件的产品和应用自行负责。为尽量减小与客户产品和应用相关的风险, 客户应提供充分的设计与操作安全措施。

TI 不对任何 TI 专利权、版权、屏蔽作品权或其它与使用了 TI 组件或服务的组合设备、机器或流程相关的 TI 知识产权中授予的直接或间接版权限作出任何保证或解释。TI 所发布的与第三方产品或服务有关的信息, 不能构成从 TI 获得使用这些产品或服务的许可、授权、或认可。使用此类信息可能需要获得第三方的专利权或其它知识产权方面的许可, 或是 TI 的专利权或其它知识产权方面的许可。

对于 TI 的产品手册或数据表中 TI 信息的重要部分, 仅在没有对内容进行任何篡改且带有相关授权、条件、限制和声明的情况下才允许进行复制。TI 对此类篡改过的文件不承担任何责任或义务。复制第三方的信息可能需要服从额外的限制条件。

在转售 TI 组件或服务时, 如果对该组件或服务参数的陈述与 TI 标明的参数相比存在差异或虚假成分, 则会失去相关 TI 组件或服务的所有明示或暗示授权, 且这是不正当的、欺诈性商业行为。TI 对任何此类虚假陈述均不承担任何责任或义务。

客户认可并同意, 尽管任何应用相关信息或支持仍可能由 TI 提供, 但他们将独自负责满足与其产品及其应用中使用 TI 产品相关的所有法律、法规和安全相关要求。客户声明并同意, 他们具备制定与实施安全措施所需的全部专业技术和知识, 可预见故障的危险后果、监测故障及其后果、降低有可能造成人身伤害的故障的发生机率并采取适当的补救措施。客户将全额赔偿因在此类安全关键应用中使用任何 TI 组件而对 TI 及其代理造成的任何损失。

在某些场合中, 为了推进安全相关应用有可能对 TI 组件进行特别的促销。TI 的目标是利用此类组件帮助客户设计和创立其特有的可满足适用的功能安全性标准和要求的终端产品解决方案。尽管如此, 此类组件仍然服从这些条款。

TI 组件未获得用于 FDA Class III (或类似的生命攸关医疗设备) 的授权许可, 除非各方授权官员已经达成了专门管控此类使用的特别协议。

只有那些 TI 特别注明属于军用等级或“增强型塑料”的 TI 组件才是设计或专门用于军事/航空应用或环境的。购买者认可并同意, 对并非指定面向军事或航空航天用途的 TI 组件进行军事或航空航天方面的应用, 其风险由客户单独承担, 并且由客户独自负责满足与此类使用相关的所有法律和法规要求。

TI 已明确指定符合 ISO/TS16949 要求的产品, 这些产品主要用于汽车。在任何情况下, 因使用非指定产品而无法达到 ISO/TS16949 要求, TI 不承担任何责任。

	产品		应用
数字音频	www.ti.com.cn/audio	通信与电信	www.ti.com.cn/telecom
放大器和线性器件	www.ti.com.cn/amplifiers	计算机及周边	www.ti.com.cn/computer
数据转换器	www.ti.com.cn/dataconverters	消费电子	www.ti.com.cn/consumer-apps
DLP® 产品	www.dlp.com	能源	www.ti.com.cn/energy
DSP - 数字信号处理器	www.ti.com.cn/dsp	工业应用	www.ti.com.cn/industrial
时钟和计时器	www.ti.com.cn/clockandtimers	医疗电子	www.ti.com.cn/medical
接口	www.ti.com.cn/interface	安防应用	www.ti.com.cn/security
逻辑	www.ti.com.cn/logic	汽车电子	www.ti.com.cn/automotive
电源管理	www.ti.com.cn/power	视频和影像	www.ti.com.cn/video
微控制器 (MCU)	www.ti.com.cn/microcontrollers		
RFID 系统	www.ti.com.cn/rfidsys		
OMAP应用处理器	www.ti.com.cn/omap		
无线连通性	www.ti.com.cn/wirelessconnectivity	德州仪器在线技术支持社区	www.deyisupport.com

Mailing Address: Texas Instruments, Post Office Box 655303, Dallas, Texas 75265
Copyright © 2016, Texas Instruments Incorporated