

# TLE42344G

Low Dropout Linear Voltage Regulator

## Data Sheet

Rev. 1.0, 2010-02-08

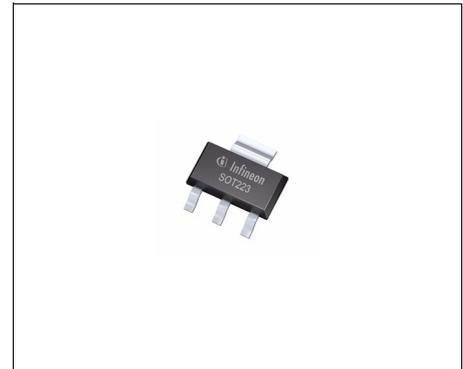
Automotive Power



## 1 Overview

### Features

- Output voltage tolerance  $\leq \pm 2\%$
- Low dropout voltage
- Output current up to 100 mA
- Very low current consumption
- Overtemperature shutdown
- Output current limitation
- Suitable for use in automotive electronics
- Reverse polarity protection
- Green Product (RoHS compliant)
- AEC Qualified



PG-SOT223-4

### Functional Description

TLE42344G is a 5 V low dropout fixed voltage regulator in an PG-SOT223-4 package. The IC regulates an input voltage  $V_I$  in the range  $5.5 \text{ V} < V_I < 45 \text{ V}$  to  $V_{Qrated} = 5.0 \text{ V}$ . The maximum output current is more than 100 mA. This IC is protected against shortcircuit and overheat by the integrated output current limitation and the overtemperature shutdown

### Dimensioning Information on External Components

The input capacitor  $C_I$  is necessary for compensating line influences. The output capacitor  $C_Q$  is necessary for the stability of the regulating circuit. Stability is guaranteed at values  $C_Q \geq 10 \mu\text{F}$  and an  $\text{ESR} \leq 10 \Omega$  within the operating temperature range.

### Circuit Description

The control amplifier compares a reference voltage, which is kept highly precise by resistance adjustment, to a voltage that is proportional to the output voltage and drives the base of the series transistor via a buffer. Saturation control, working as a function of load current, prevents any over-saturation of the power element.

Type	Package	Marking
TLE42344G	PG-SOT223-4	42344

## 2 Block Diagram

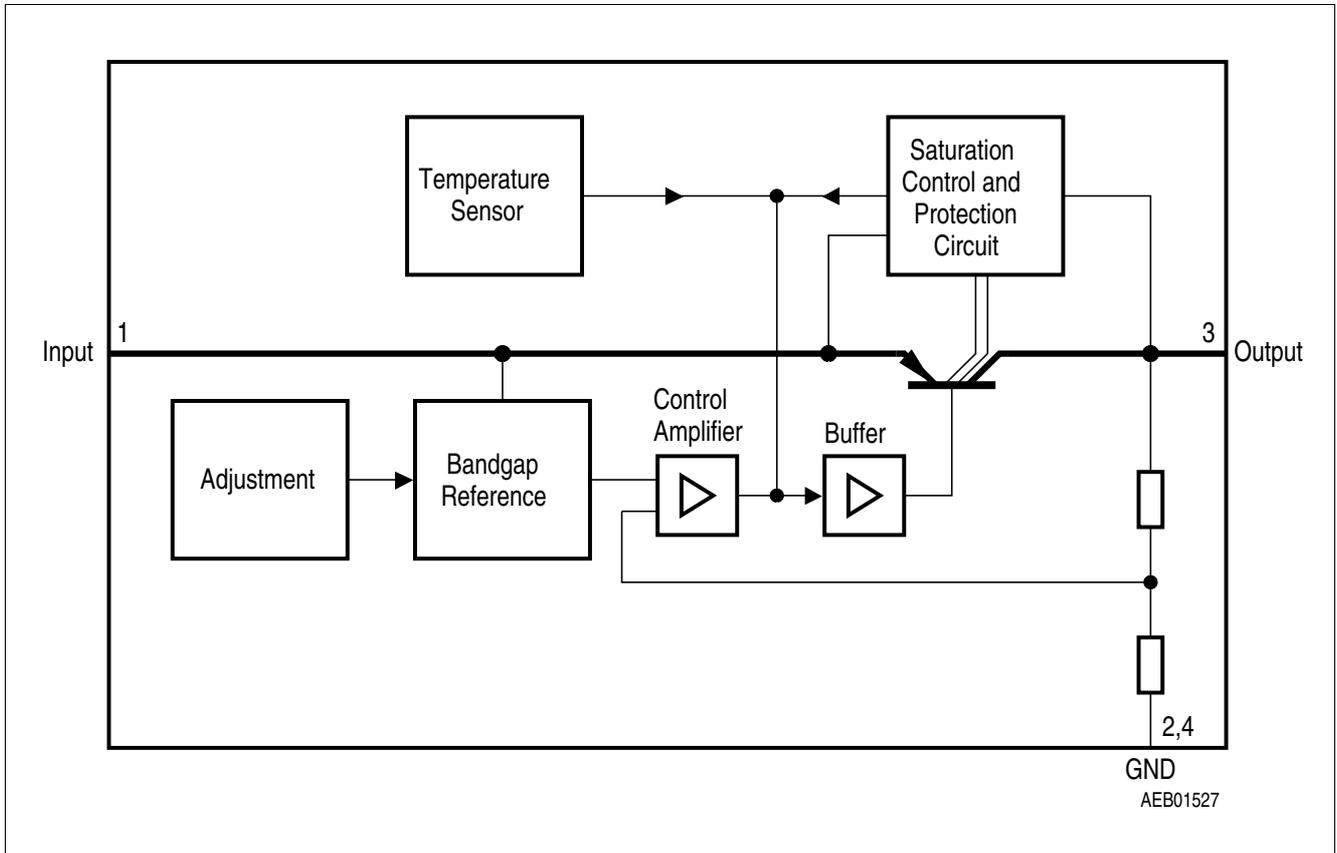


Figure 1 Block Diagram

### 3 Pin Configuration

#### 3.1 Pin Assignment

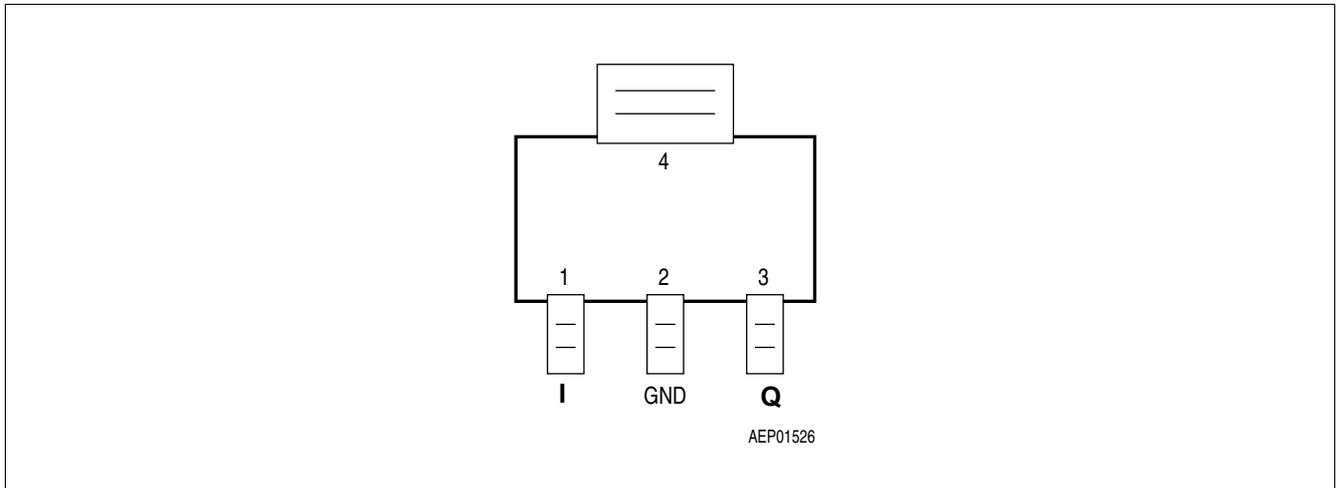


Figure 2 Pin Configuration

#### 3.2 Pin Definitions and Functions

Pin	Symbol	Function
1	I	<b>Input Voltage</b> ; block to ground directly on IC with ceramic capacitor
2, 4	GND	<b>Ground</b>
3	Q	<b>5 V Output Voltage</b> ; block to ground with $\geq 10 \mu\text{F}$ capacitor, $\text{ESR} \leq 10 \Omega$

## 4 General Product Characteristics

### 4.1 Absolute Maximum Ratings

#### Absolute Maximum Ratings <sup>1)</sup>

$T_j = -40\text{ °C}$  to  $+150\text{ °C}$ ; all voltages with respect to ground, positive current flowing into pin (unless otherwise specified)

Pos.	Parameter	Symbol	Limit Values		Unit	Conditions
			Min.	Max.		
<b>Input</b>						
4.1.1	Input voltage	$V_I$	-30	45	V	–
<b>Output</b>						
4.1.2	Output voltage	$V_Q$	-1	32	V	–
<b>Temperatures</b>						
4.1.3	Junction Temperature	$T_j$	-40	150	°C	–
4.1.4	Storage Temperature	$T_{stg}$	-50	150	°C	–
<b>ESD Susceptibility</b>						
4.1.5	ESD Resistivity to GND	$V_{ESD}$	-4	4	kV	HBM <sup>2)</sup>
4.1.6	ESD Resistivity to GND	$V_{ESD}$	-1.5	1.5	kV	CDM <sup>3)</sup>

1) Not subject to production test, specified by design.

2) ESD susceptibility, HBM according to EIA/JESD 22-A114B

3) ESD susceptibility, Charged Device Model "CDM" EIA/JESD22-C101 or ESDA STM5.3.1

*Note: Stresses above the ones listed here may cause permanent damage to the device. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.*

*Note: Integrated protection functions are designed to prevent IC destruction under fault conditions described in the data sheet. Fault conditions are considered as "outside" normal operating range. Protection functions are not designed for continuous repetitive operation.*

### 4.2 Functional Range

**Table 1 Functional Range**

Pos.	Parameter	Symbol	Limit Values		Unit	Conditions
			Min.	Max.		
4.2.1	Input Voltage	$V_I$	5.5	45	V	
4.2.2	Junction Temperature	$T_j$	-40	150	°C	–

*Note: Within the functional or operating range, the IC operates as described in the circuit description. The electrical characteristics are specified within the conditions given in the Electrical Characteristics table.*

### 4.3 Thermal Resistance

Note: This thermal data was generated in accordance with JEDEC JESD51 standards. For more information, go to [www.jedec.org](http://www.jedec.org).

Pos.	Parameter	Symbol	Limit Values			Unit	Conditions
			Min.	Typ.	Max.		
4.3.1	Junction to Case <sup>1)</sup>	$R_{thJC}$	–	17	–	K/W	measured to heat slug
4.3.2	Junction to Ambient <sup>1)</sup>	$R_{thJA}$	–	54	–	K/W	<sup>2)</sup>
4.3.3			–	139	–	K/W	footprint only <sup>3)</sup>
4.3.4			–	73	–	K/W	300 mm <sup>2</sup> heatsink area <sup>3)</sup>
4.3.5			–	64	–	K/W	600 mm <sup>2</sup> heatsink area <sup>3)</sup>

1) Not subject to production test, specified by design.

2) Specified  $R_{thJA}$  value is according to Jedec JESD51-2,-5,-7 at natural convection on FR4 2s2p board; The Product (Chip+Package) was simulated on a 76.2 x 114.3 x 1.5 mm<sup>3</sup> board with 2 inner copper layers (2 x 70µm Cu, 2 x 35µm Cu). Where applicable a thermal via array under the exposed pad contacted the first inner copper layer.

3) Specified  $R_{thJA}$  value is according to Jedec JESD 51-3 at natural convection on FR4 1s0p board; The Product (Chip+Package) was simulated on a 76.2 x 114.3 x 1.5 mm<sup>3</sup> board with 1 copper layer (1 x 70µm Cu).

## 5 Electrical Characteristics

### 5.1 Electrical Characteristics Voltage Regulator

**Electrical Characteristics:**

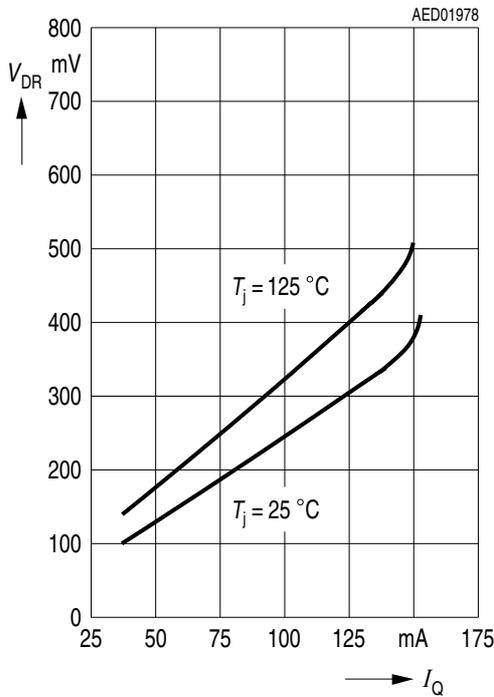
$V_1 = 13.5\text{ V}$ ,  $T_j = -40\text{ °C}$  to  $+150\text{ °C}$ , all voltages with respect to ground, positive current flowing into pin (unless otherwise specified)

Pos.	Parameter	Symbol	Limit Values			Unit	Conditions
			Min.	Typ.	Max.		
5.1.1	Output voltage	$V_Q$	4.9	5.0	5.1	V	$5\text{ mA} \leq I_Q \leq 100\text{ mA}$ $6\text{ V} \leq V_1 \leq 28\text{ V}$
5.1.2	Output current limitation	$I_Q$	120	160	–	mA	–
5.1.3	Current consumption $I_q = I_1 - I_Q$	$I_q$	–	–	400	$\mu\text{A}$	$I_Q = 1\text{ mA}$
5.1.4	Current consumption $I_q = I_1 - I_Q$	$I_q$	–	9	15	mA	$I_Q = 100\text{ mA}$
5.1.5	Drop voltage	$V_{dr}$	–	0.25	0.5	V	$I_Q = 100\text{ mA}^{1)}$
5.1.6	Load regulation	$\Delta V_Q$	–	–	40	mV	$I_Q = 5\text{ to }100\text{ mA}$ $V_1 = 6\text{ V}$
5.1.7	Line regulation	$\Delta V_Q$	–	15	30	mV	$V_1 = 6\text{ to }28\text{ V}$ $I_Q = 5\text{ mA}$
5.1.8	Power Supply ripple rejection	$PSRR$	–	54	–	dB	$f_r = 100\text{ Hz}$ $V_r = 0.5\text{ Vpp}$

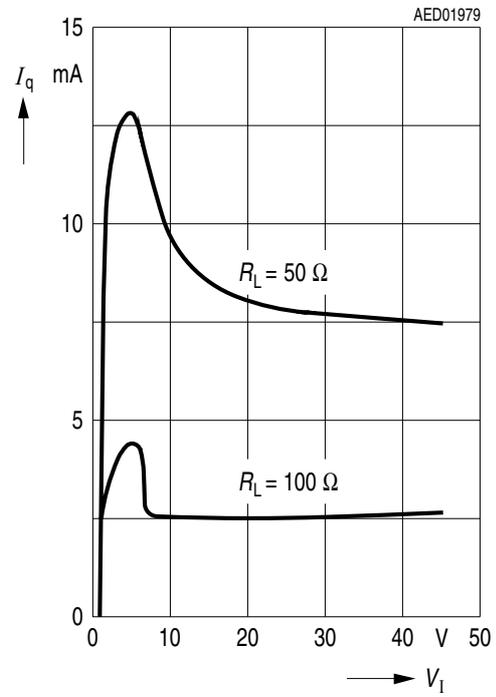
1) Drop voltage =  $V_1 - V_Q$  (measured where  $V_Q$  has dropped 100 mV from the nominal value obtained at  $V_1 = 13.5\text{ V}$ ).

## 5.2 Typical Performance Characteristics Voltage Regulator

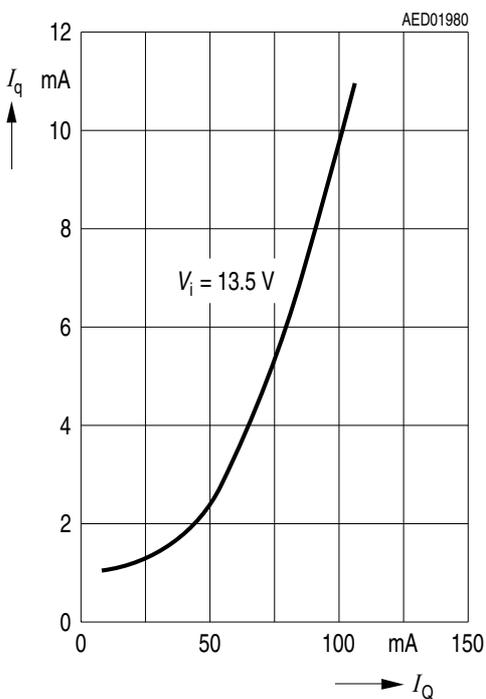
Dropout Voltage  $V_{DR}$  versus Output Current  $I_Q$



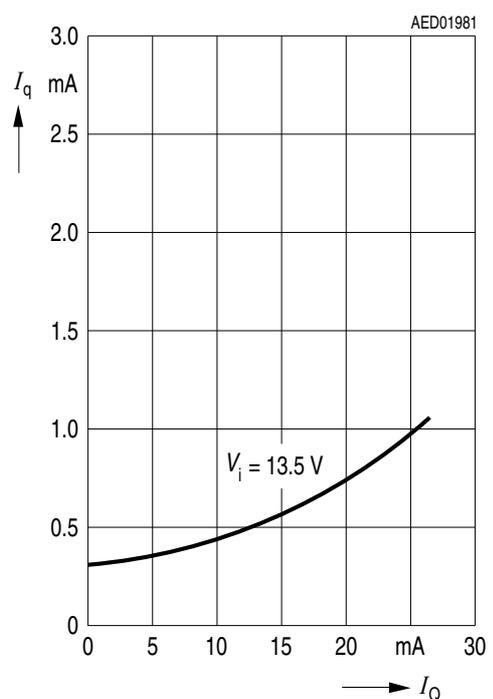
Current Consumption  $I_q$  versus Input Voltage  $V_I$



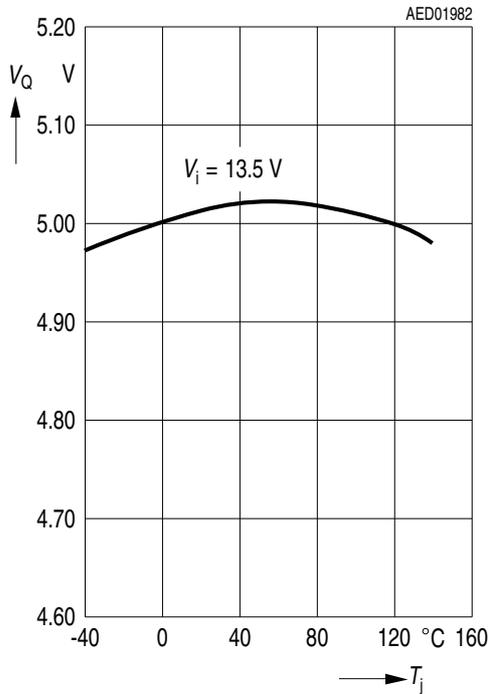
Current Consumption  $I_q$  versus Output Current  $I_Q$



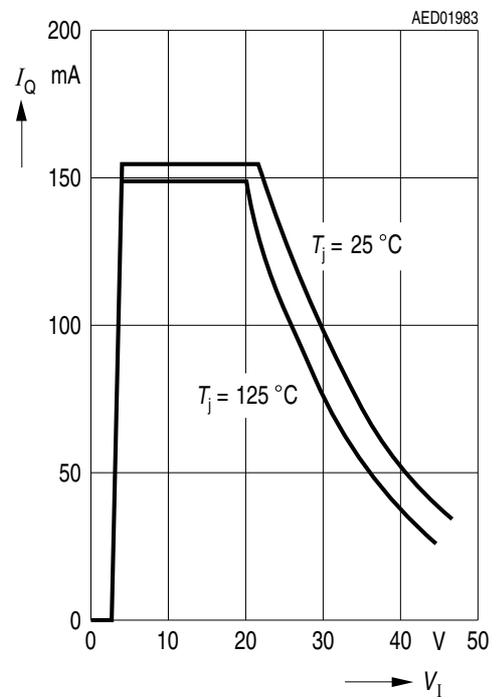
Current Consumption  $I_q$  versus Output Current  $I_Q$



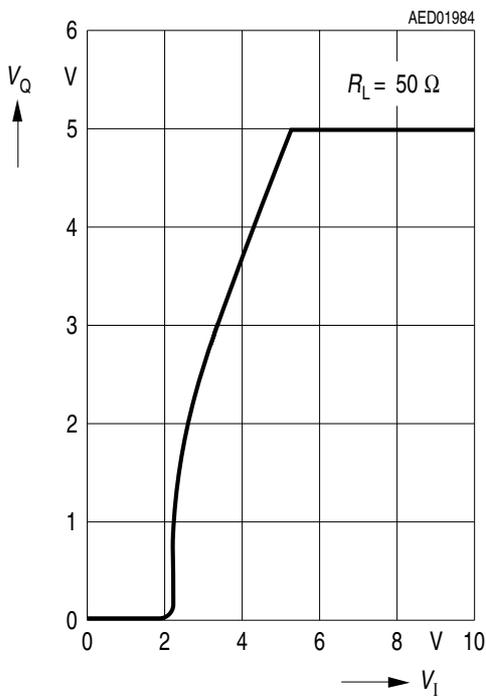
Output Voltage  $V_Q$  versus Temperature  $T_j$



Output Current  $I_Q$  versus Input Voltage  $V_I$



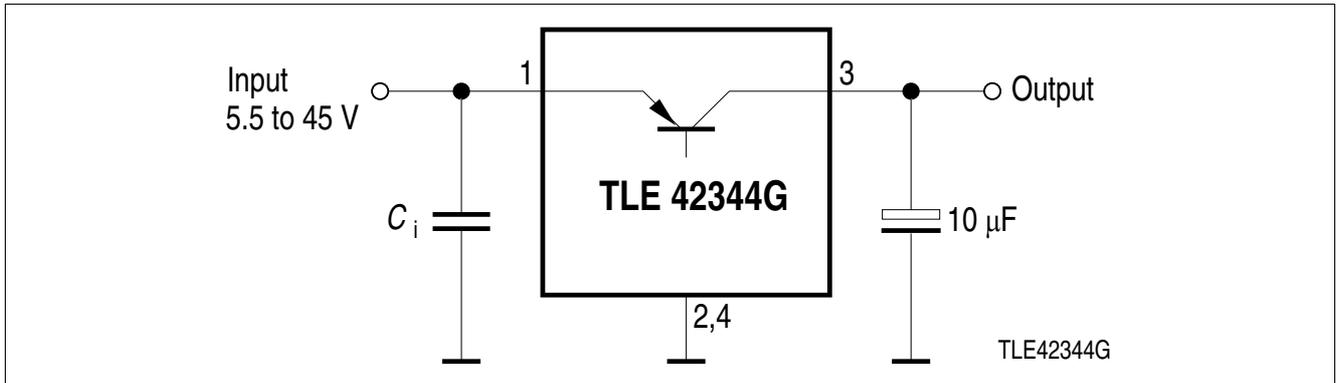
Output Voltage  $V_Q$  versus Input Voltage  $V_I$



## 6 Application Information

*Note: The following information is given as a hint for the implementation of the device only and shall not be regarded as a description or warranty of a certain functionality, condition or quality of the device.*

(1)



**Figure 3 Application Diagram**

*Note: This is a very simplified example of an application circuit. The function must be verified in the real application.*

### 6.1 Further Application Information

- For further information you may contact <http://www.infineon.com/>

## 7 Package Outlines

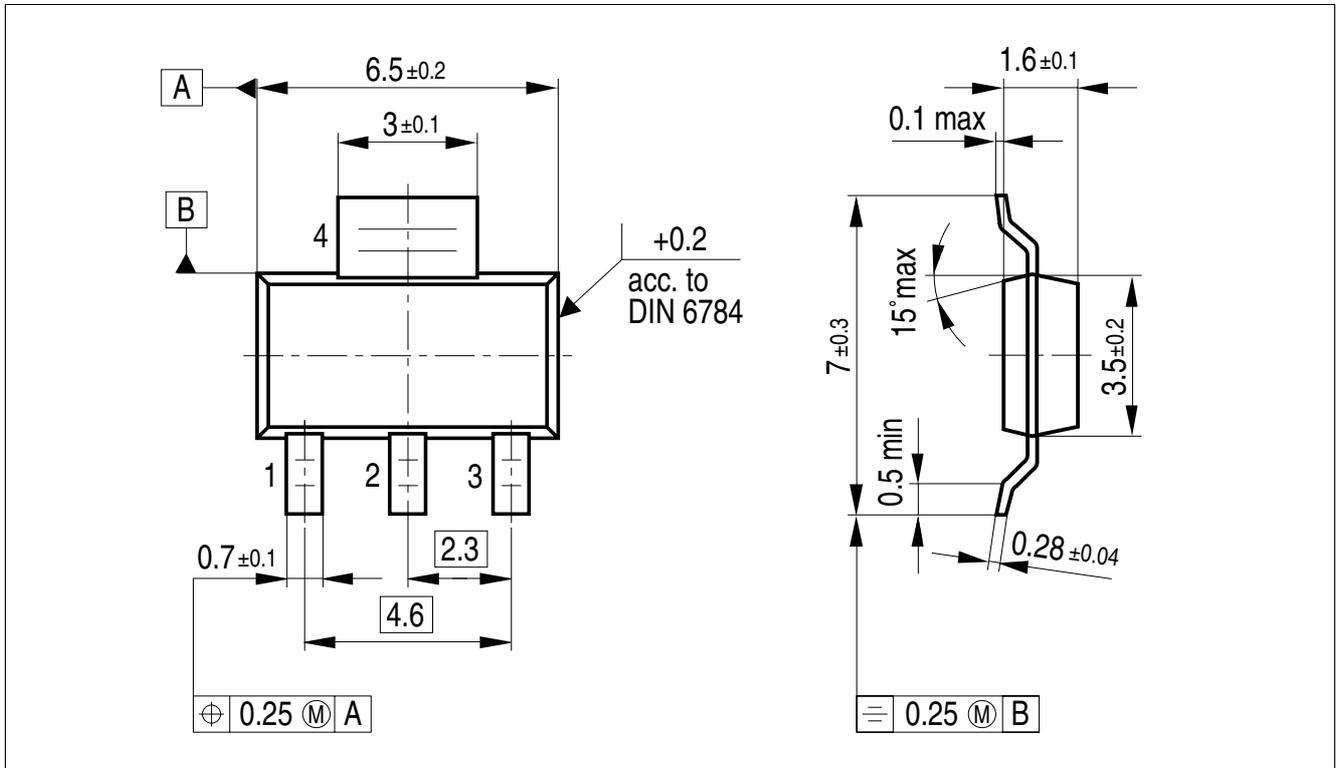


Figure 4 PG-SOT223-4 (Plastic Small Outline Transistor)

### Green Product (RoHS compliant)

To meet the world-wide customer requirements for environmentally friendly products and to be compliant with government regulations the device is available as a green product. Green products are RoHS-Compliant (i.e. Pb-free finish on leads and suitable for Pb-free soldering according to IPC/JEDEC J-STD-020).

## 8 Revision History

Revision	Date	Changes
1.0	2010-02-08	Initial data sheet

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