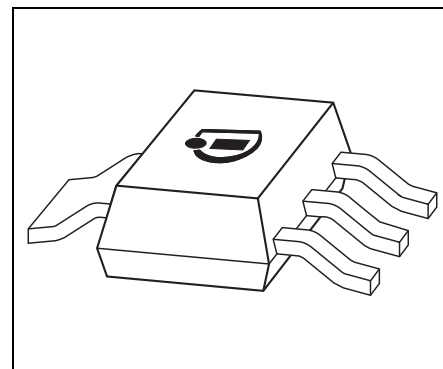




## Features

- Output voltage tolerance  $\leq \pm 3\%$  ( $\pm 2\%$  up to 50 mA)
- 150 mA current capability
- Low-drop voltage
- Very low current consumption: 40  $\mu\text{A}$
- Overtemperature protection
- Short-circuit proof
- Suitable for use in automotive electronics
- Reverse polarity proof
- Green Product (RoHS compliant)
- AEC Qualified



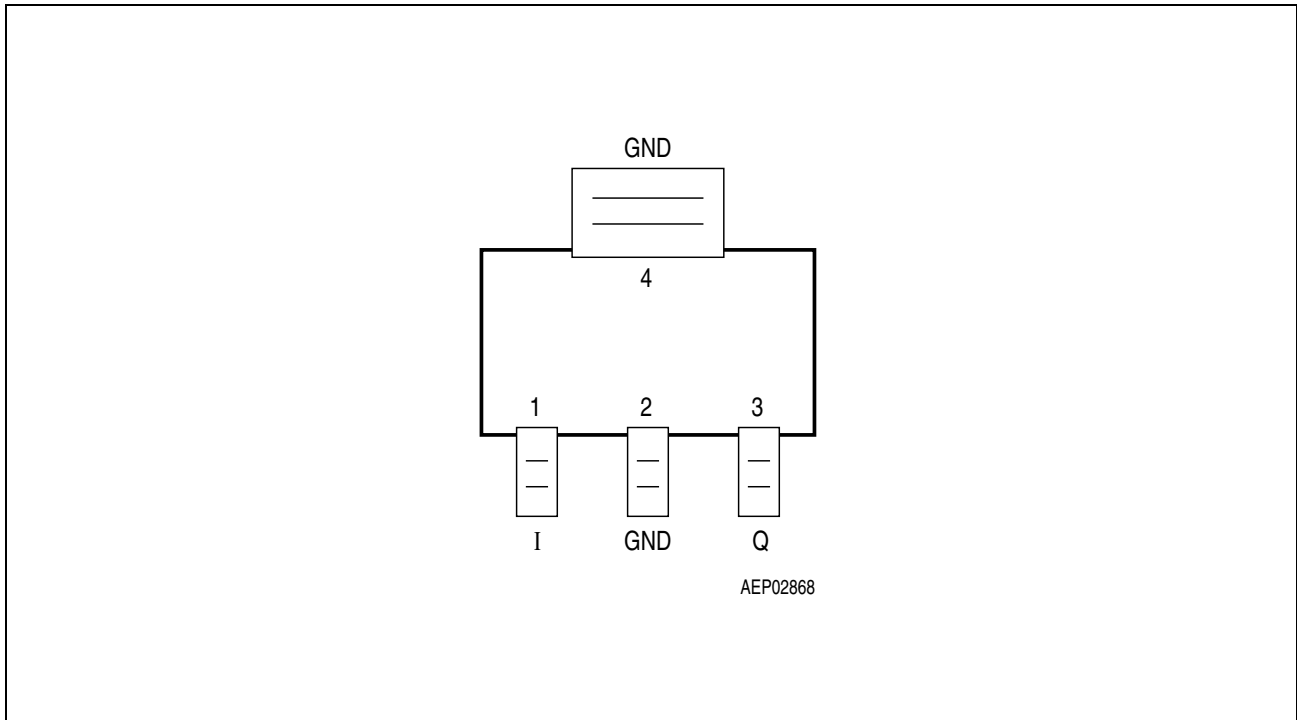
## Functional Description

The TLE 4264-2 is a monolithic integrated low-drop fixed voltage regulator which can supply loads up to 150 mA. It is functional compatible to the TLE 4264, but has a reduced quiescent current of typ. 40  $\mu\text{A}$ . The TLE 4264-2 is especially designed for all applications which require very low quiescent currents. The device is available in the small surface mounted PG-SOT223-4 package. The device is pin compatible to the TLE 4264. The regulator is designed to supply microprocessor systems under the severe condition of automotive applications and is therefore equipped with additional protection against overload, short-circuit and overtemperature. Of course the TLE 4264-2 can be used in all other applications, wherever a stabilized voltage is required.

An input voltage  $V_I$  in the range of  $5.5 \text{ V} < V_I < 45 \text{ V}$  is regulated to  $V_{Q,nom} = 5 \text{ V}$  with an accuracy of  $\pm 3\%$ . An accuracy of  $\pm 2\%$  is kept for a load current range up to 50 mA.

The device operates in the temperature range of  $T_j = -40$  to  $150 \text{ }^\circ\text{C}$ .

Type	Package
TLE 4264-2 G	PG-SOT223-4



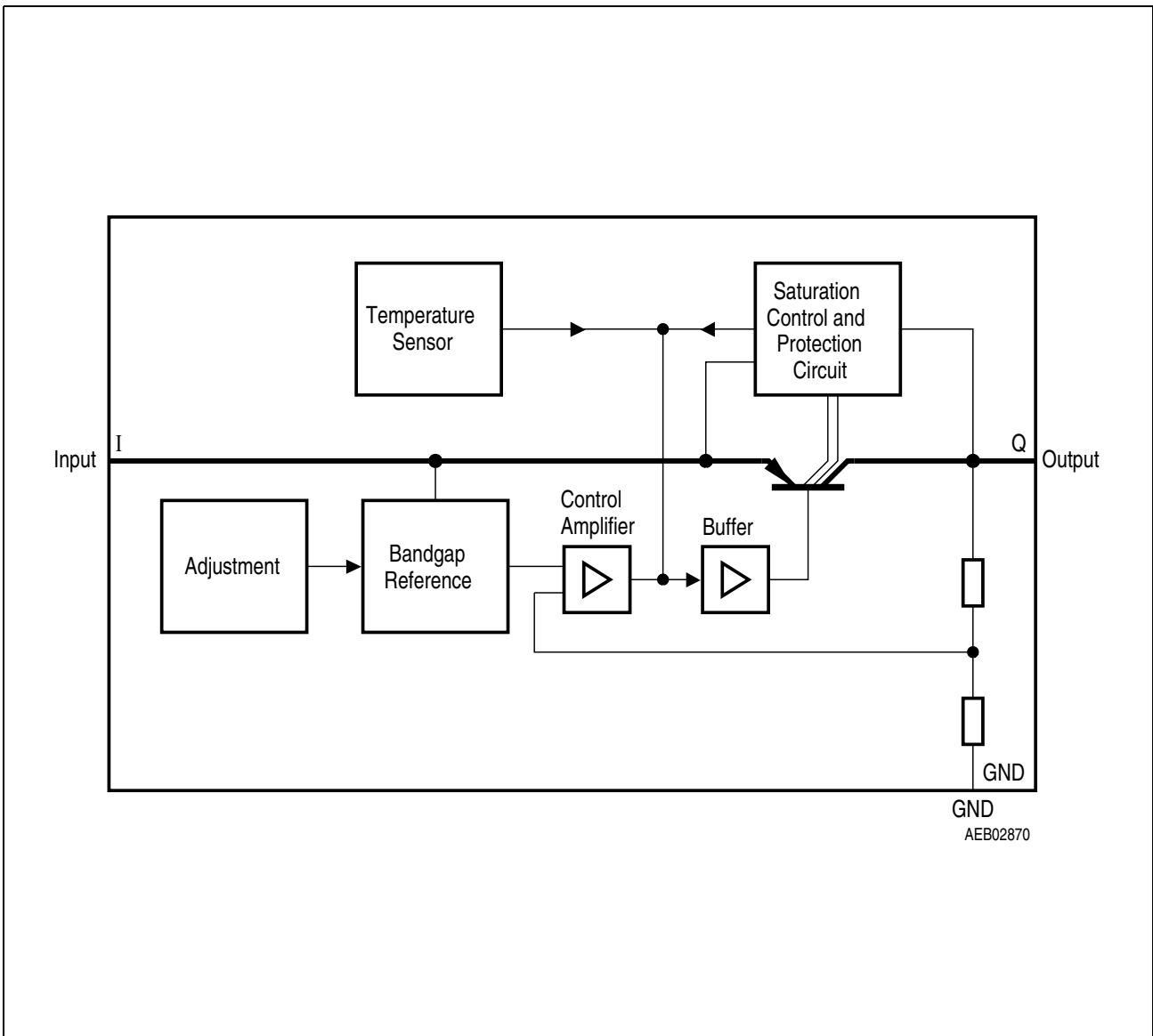
**Figure 1** Pin Configuration (top view)

**Table 1** Pin Definitions and Functions

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

### 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. The IC is additionally protected against overload, overtemperature and reverse polarity.



**Figure 2** Block Diagram

**Table 2 Absolute Maximum Ratings**

Parameter	Symbol	Limit Values		Unit	Notes
		Min.	Max.		
<b>Input I</b>					
Input voltage	$V_I$	-42	45	V	–
Input current	$I_I$	–	–	–	limited internally
<b>Output Q</b>					
Output voltage	$V_Q$	-0.3	32	V	–
Output current	$I_Q$	–	–	–	limited internally
<b>Ground GND</b>					
Current	$I_{GND}$	50	–	mA	–
<b>Temperatures</b>					
Junction temperature	$T_j$	–	150	°C	–
Storage temperature	$T_{stg}$	-50	150	°C	–
<b>Thermal Resistances</b>					
Junction-ambient	$R_{thj-a}$	–	164	K/W	PG-SOT223-4 <sup>1)</sup>
	$R_{thj-a}$	–	81	K/W	PG-SOT223-4, 300 mm <sup>2</sup> heat sink area
Junction-pin	$R_{thj-p}$	–	17	K/W	PG-SOT223-4 <sup>2)</sup>
<b>Operating Range</b>					
Input voltage	$V_I$	5.5	45	V	–
Junction temperature	$T_j$	-40	150	°C	–

1) Package mounted on PCB 80 × 80 × 1.5mm<sup>3</sup>; 35μ Cu; 5μ Sn; Footprint only; zero airflow.

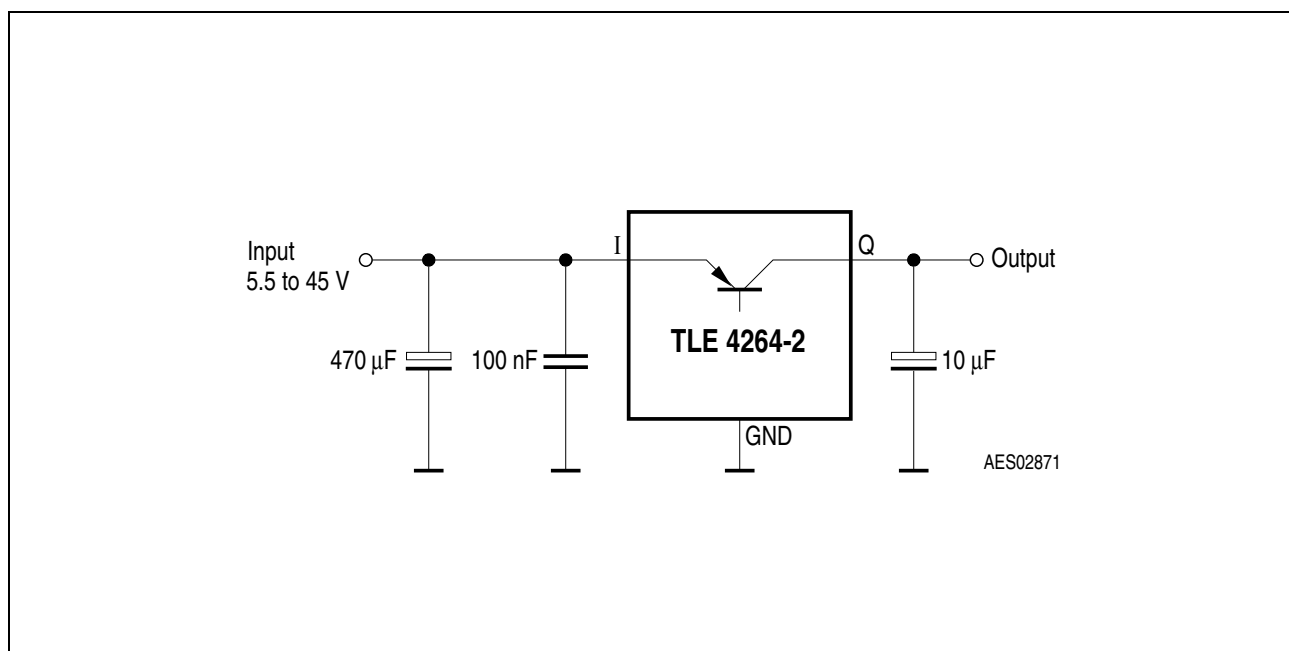
2) Measured to pin 4.

**Table 3 Characteristics**
 $V_I = 13.5 \text{ V}; -40 \text{ °C} \leq T_j \leq 125 \text{ °C}$ , unless specified otherwise

Parameter	Symbol	Limit Values			Unit	Test Conditions
		Min.	Typ.	Max.		
Output voltage	$V_Q$	4.85	5.0	5.15	V	$5 \text{ mA} \leq I_Q \leq 100 \text{ mA}$ $6 \text{ V} \leq V_I \leq 21 \text{ V}$
Output voltage	$V_Q$	4.9	5.0	5.1	V	$5 \text{ mA} \leq I_Q \leq 50 \text{ mA}$ $9 \text{ V} \leq V_I \leq 16 \text{ V}$
Output-current limiting	$I_Q$	150	200	500	mA	–
Current consumption $I_q = I_I - I_Q$	$I_q$	–	40	60	$\mu\text{A}$	$I_Q = 100 \mu\text{A}$ , $T_j \leq 85 \text{ °C}$
		–	40	70	$\mu\text{A}$	$I_Q = 100 \mu\text{A}$ ,
Current consumption $I_q = I_I - I_Q$	$I_q$	–	1.7	4	mA	$I_Q = 50 \text{ mA}$
Drop voltage	$V_{dr}$	–	0.22	0.5	V	$I_Q = 100 \text{ mA}^{1)}$
Load regulation	$\Delta V_{Q, lo}$	–	50	90	mV	$I_Q = 1 \text{ to } 100 \text{ mA}$ $V_I = 13.5 \text{ V}$
Line regulation	$\Delta V_{Q, li}$	–	5	30	mV	$V_I = 6 \text{ to } 28 \text{ V}$ $I_Q = 1 \text{ mA}$
Power Supply Ripple Rejection	$PSRR$	–	68	–	dB	$f_r = 100 \text{ Hz}$ $V_r = 0.5 \text{ Vpp}$
Output Capacitor	$C_Q$	10	–	–	$\mu\text{F}$	$\text{ESR} \leq 4 \Omega \text{ at } 10 \text{ kHz}$

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

## Application Information



**Figure 3 Application Circuit**

In the TLE 4264-2 the output voltage is divided and compared to an internal reference of 2.5 V typical. The regulation loop controls the output to achieve an output voltage of 5 V with an accuracy of  $\pm 3\%$  at an input voltage range of  $5.5\text{ V} < V_I < 45\text{ V}$ .

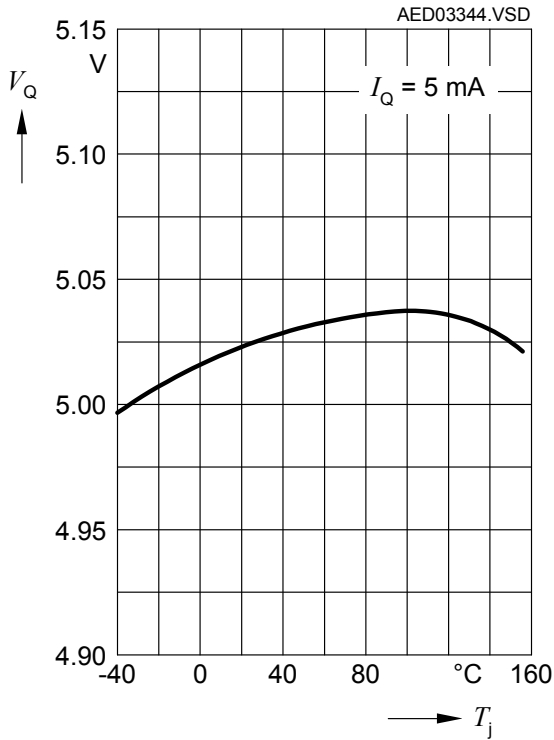
**Figure 4** shows a typical application circuit. For stability of the control loop the TLE 4264-2 output requires an output capacitor  $C_Q$  of at least  $10\text{ }\mu\text{F}$  with a maximum permissible ESR of  $4\text{ }\Omega$ . Tantalum as well as multi layer ceramic capacitors are suitable. At the input of the regulator an input capacitor is necessary for compensating line influences ( $100\text{ nF}$  ceramic capacitor recommended). A resistor of approx.  $1\text{ }\Omega$  in series with  $C_I$ , can damp any oscillation occurring due the input inductivity and the input capacitor.

In the application circuit shown in **Figure 4** an additional electrolytic input capacitor of  $470\text{ }\mu\text{F}$  is added in order to buffer supply line influences. This capacitor is recommended, if the device is sourced via long supply lines of several meters.

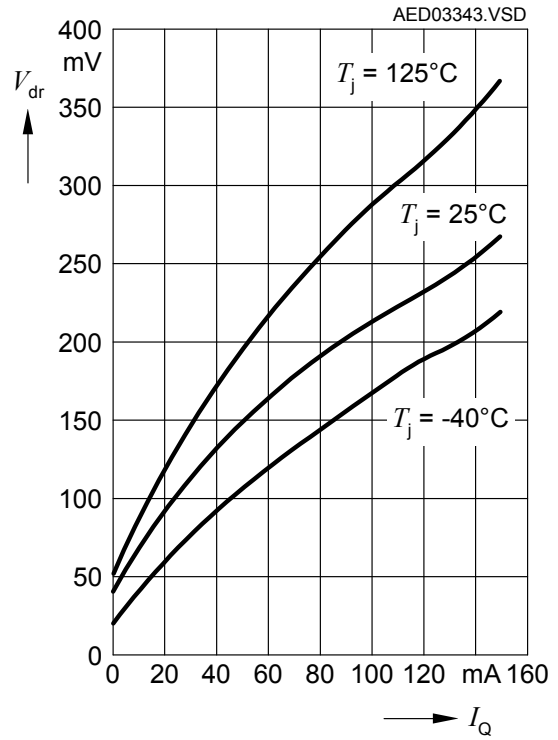
The TLE 4264-2 can supply up to 150 mA. However for protection for high input voltage above 25 V, the output current is reduced (SOA protection).

**Typical Performance Characteristics**

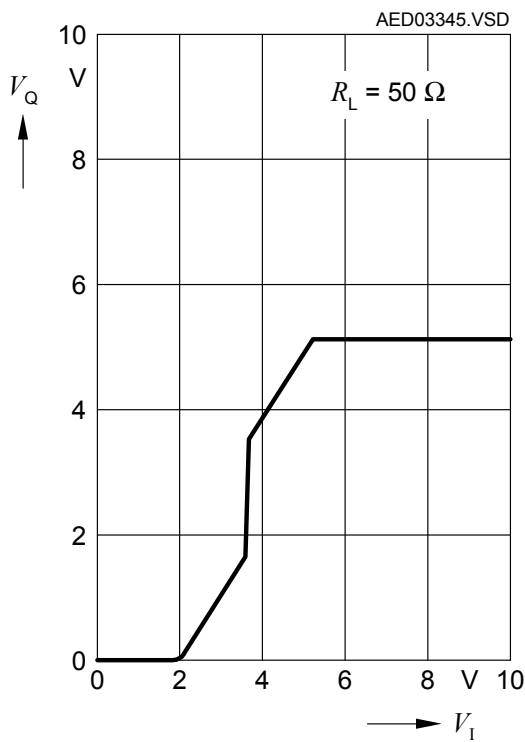
**Output Voltage  $V_Q$  versus Temperature  $T_j$**



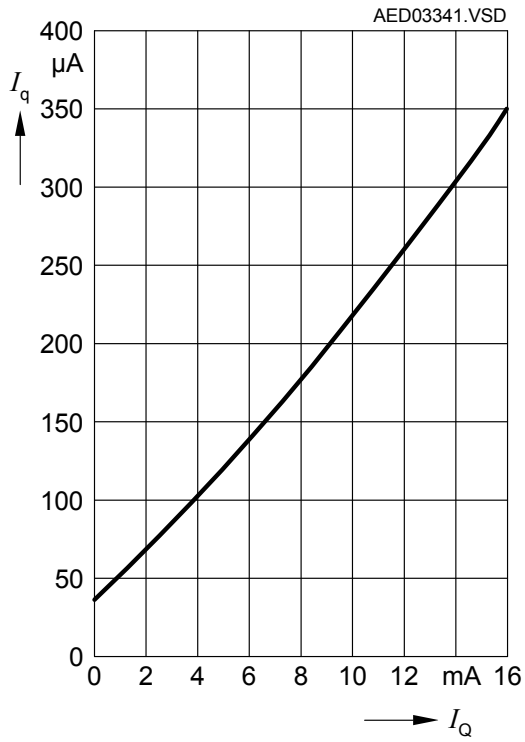
**Drop Voltage  $V_{dr}$  versus Output Current  $I_Q$**



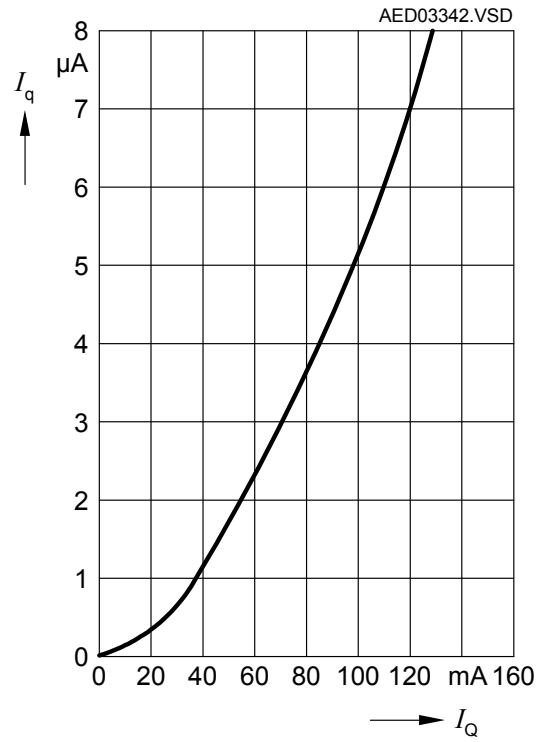
**Output Voltage  $V_Q$  versus Input Voltage  $V_I$**



**Current Consumption  $I_q$  versus Output Current  $I_Q$**

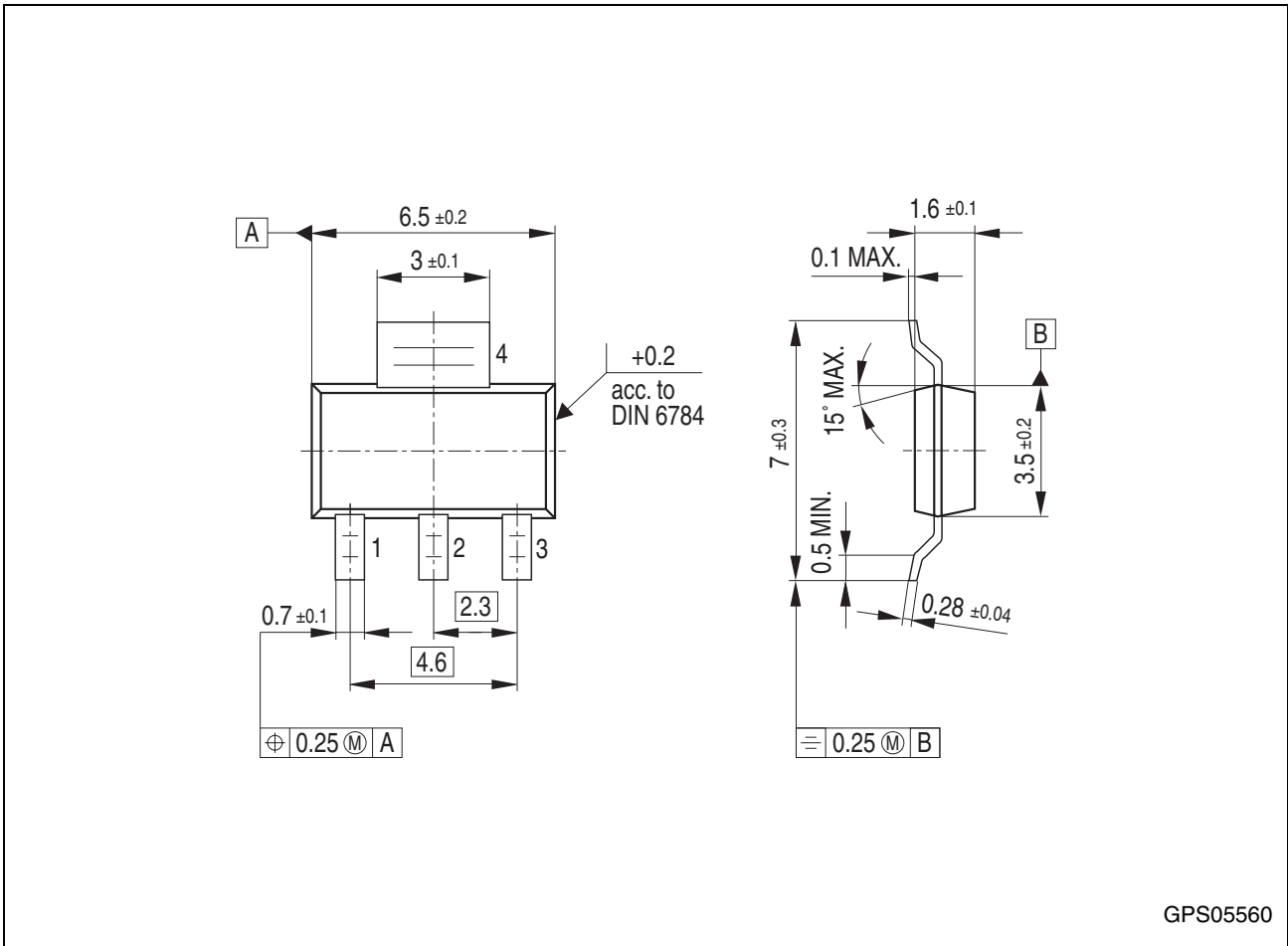


**Current Consumption  $I_q$  versus Output Current  $I_Q$**





Package Outlines



GPS05560

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).

You can find all of our packages, sorts of packing and others in our Infineon Internet Page "Products": <http://www.infineon.com/products>.

SMD = Surface Mounted Device

Dimensions in mm

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**Revision History**

<b>Version</b>	<b>Date</b>	<b>Changes</b>
Rev. 2.6	2008-03-10	Simplified package name to PG-SOT223-4. No modification of released product.
Rev. 2.5	2007-03-20	Initial version of RoHS-compliant derivate of TLE 4264-2 <b>Page 1</b> : AEC certified statement added <b>Page 1</b> and <b>Page 9</b> : RoHS compliance statement and Green product feature added <b>Page 1</b> and <b>Page 9</b> : Package changed to RoHS compliant version Legal Disclaimer updated

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