

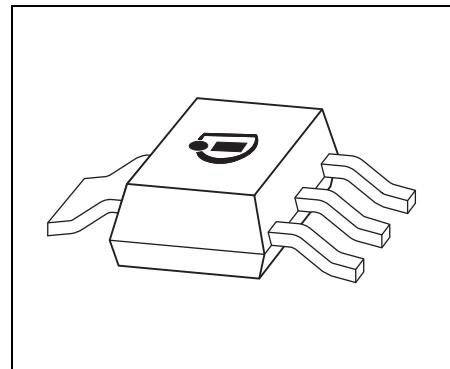
## Voltage Regulator

**TLE 4274 / 3.3V;2.5V**



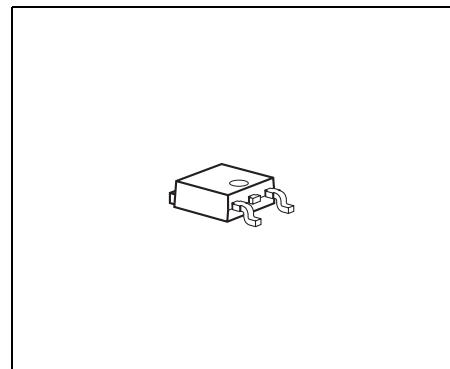
### Features

- Output voltage: 3.3 V/2.5 V  $\pm$  4%
- Current capability 400 mA
- Very low current consumption
- Short-circuit proof
- Reverse polarity proof
- Suitable for use in automotive electronics
- Green Product (RoHS compliant)
- AEC Qualified



### Functional Description

The TLE 4274 / 3.3V;2.5V is a voltage regulator available in a SOT223 and TO252 package. The IC regulates an input voltage up to 40 V to  $V_{Q\text{rated}} = 3.3$  V/2.5 V. The maximum output current is 400 mA. The IC is short-circuit proof and has a shutdown circuit protecting it against overtemperature. The TLE 4274 is also available as 5 V, 8.5 V and 10 V version. Please refer to the data sheet TLE 4274.



### Dimensioning Information on External Components

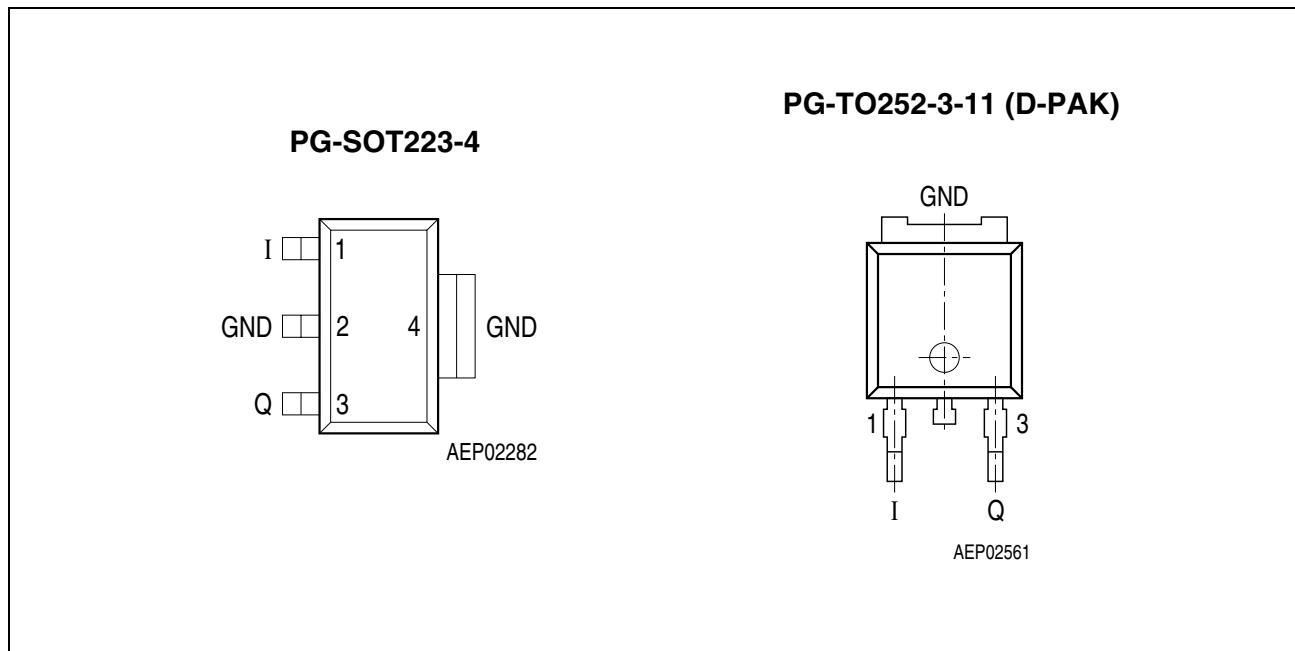
The input capacitor  $C_I$  is necessary for compensating line influences. Using a resistor of approx. 1  $\Omega$  in series with  $C_I$ , the oscillating of input inductivity and input capacitance can be damped. The output capacitor  $C_Q$  is necessary for the stability of the regulation circuit. Stability is guaranteed for capacities  $C_Q \geq 10 \mu\text{F}$  with an ESR of  $\leq 2.5 \Omega$  within the operating temperature range.

Type	Package
TLE 4274 GSV33	PG-SOT223-4
TLE 4274 DV33	PG-TO252-3-11
TLE 4274 GSV25	PG-SOT223-4

## Circuit Description

The control amplifier compares a reference voltage to a voltage that is proportional to the output voltage and drives the base of the series transistor via a buffer. Saturation control as a function of the load current prevents any oversaturation of the power element. The IC also includes a number of internal circuits for protection against:

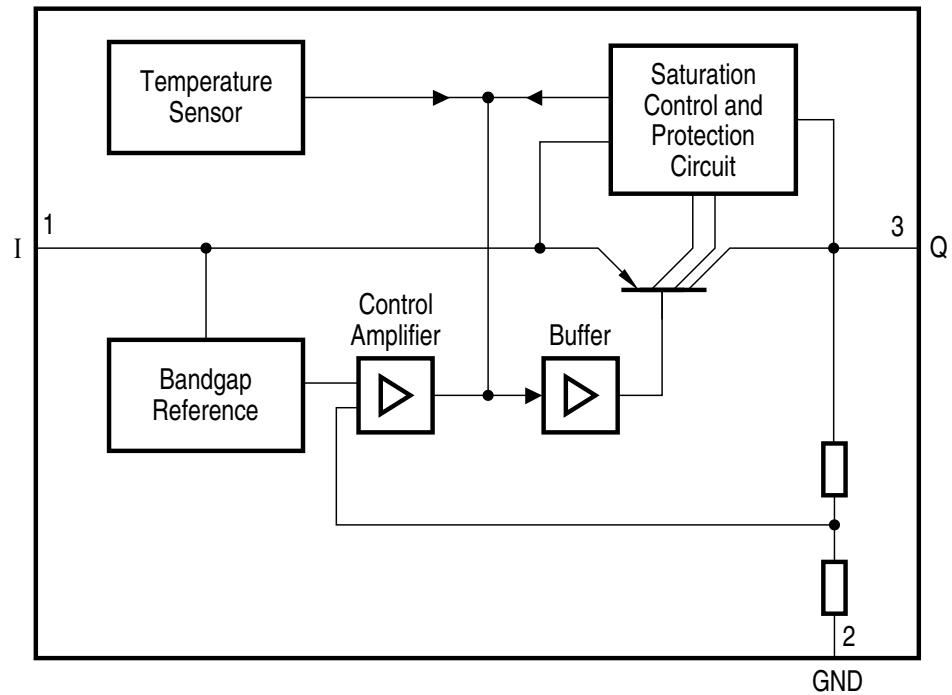
- Overload
- Overtemperature
- Reverse polarity



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

**Table 1** Pin Definitions and Functions

Pin No.	Symbol	Function
1	I	<b>Input</b> ; block to ground directly at the IC with a ceramic capacitor.
2, 4	GND	<b>Ground</b> ; PG-TO252-3-11: internally connected to heatsink
3	Q	<b>Output</b> ; block to ground with capacitor $C_Q \geq 10 \mu F$ , $ESR \leq 2.5 \Omega$



**Figure 2 Block Diagram**

**Table 2      Absolute Maximum Ratings**
 $T_j = -40$  to  $150$  °C

Parameter	Symbol	Limit Values		Unit	Test Condition
		Min.	Max.		
<b>Input</b>					
Voltage	$V_I$	-42	45	V	-
Current	$I_I$	-	-	-	Internally limited
<b>Output</b>					
Voltage	$V_Q$	-1.0	40	V	-
Current	$I_Q$	-	-	-	Internally limited
<b>Ground</b>					
Current	$I_{GND}$	-	100	mA	-
<b>Temperature</b>					
Junction temperature	$T_j$	-	150	°C	-
Storage temperature	$T_{stg}$	-50	150	°C	-

*Note: Maximum ratings are absolute ratings; exceeding any one of these values may cause irreversible damage to the integrated circuit.*

**Table 3      Operating Range**

Parameter	Symbol	Limit Values		Unit	Remarks
		Min.	Max.		
Input voltage	$V_I$	4.7	40	V	-
Junction temperature	$T_j$	-40	150	°C	-

**Thermal Resistance**

Junction ambient	$R_{thja}$	-	100	K/W	SOT223 <sup>1)</sup>
Junction ambient	$R_{thja}$	-	70	K/W	TO252 <sup>2)</sup>
Junction case	$R_{thjc}$	-	25	K/W	SOT223
Junction case	$R_{thjc}$	-	4	K/W	TO252

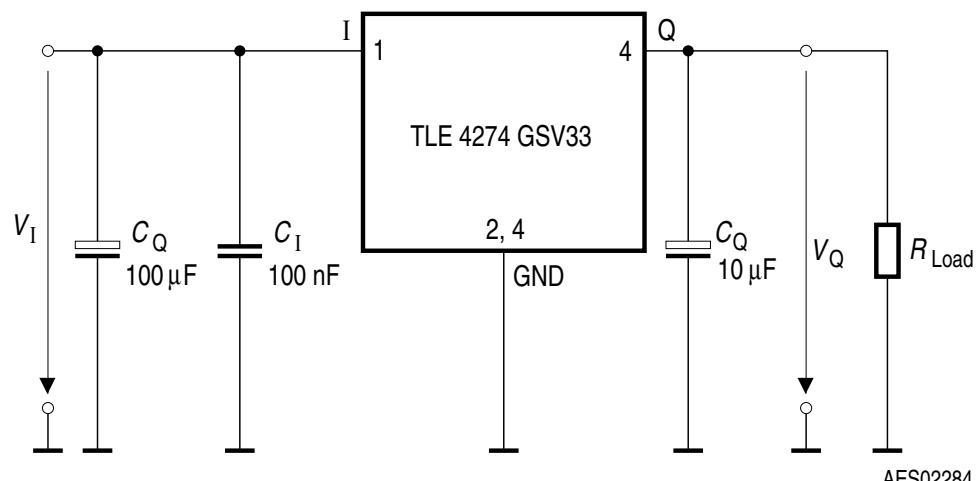
1) Soldered in, 1 cm<sup>2</sup> copper area at pin 4, FR4

2) Soldered in, minimal footprint, FR4

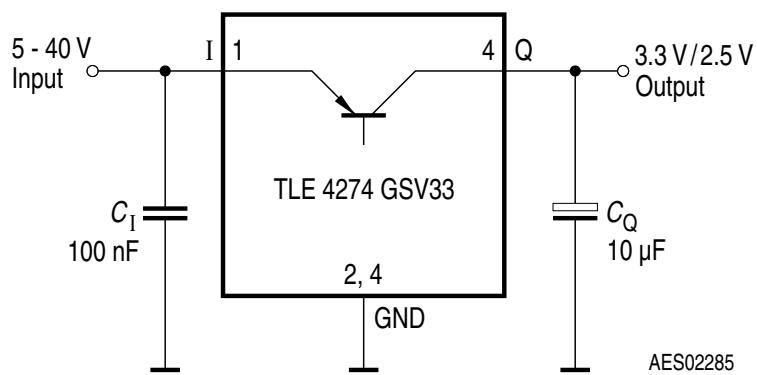
**Table 4 Characteristics**
 $V_I = 6 \text{ V}$ ;  $-40^\circ\text{C} < T_j < 150^\circ\text{C}$  (unless otherwise specified)

Parameter	Symbol	Limit Values			Unit	Measuring Condition
		Min.	Typ.	Max.		
Output voltage V33-Version	$V_Q$	3.17	3.3	3.44	V	$5 \text{ mA} < I_Q < 400 \text{ mA}$ $4.7 \text{ V} < V_I < 28 \text{ V}$
Output voltage V33-Version	$V_Q$	3.17	3.3	3.44	V	$5 \text{ mA} < I_Q < 200 \text{ mA}$ $4.7 \text{ V} < V_I < 40 \text{ V}$
Output voltage V25-Version	$V_Q$	2.4	2.5	2.6	V	$5 \text{ mA} < I_Q < 400 \text{ mA}$ $4.7 \text{ V} < V_I < 28 \text{ V}$
Output voltage V25-Version	$V_Q$	2.4	2.5	2.6	V	$5 \text{ mA} < I_Q < 200 \text{ mA}$ $4.7 \text{ V} < V_I < 40 \text{ V}$
Output current limitation <sup>1)</sup>	$I_Q$	400	600	—	mA	—
Current consumption; $I_q = I_I - I_Q$	$I_q$	—	100	220	μA	$I_Q = 1 \text{ mA}$
Current consumption; $I_q = I_I - I_Q$	$I_q$	—	8	15	mA	$I_Q = 250 \text{ mA}$
Current consumption; $I_q = I_I - I_Q$	$I_q$	—	20	30	mA	$I_Q = 400 \text{ mA}$
Drop voltage <sup>1)</sup> V33-Version	$V_{dr}$	—	0.7	1.2	V	$I_Q = 300 \text{ mA}$ $V_{dr} = V_I - V_Q$
Drop voltage <sup>1)</sup> V25-Version	$V_{dr}$	—	1.0	2.0	V	$I_Q = 300 \text{ mA}$ $V_{dr} = V_I - V_Q$
Load regulation	$\Delta V_Q$	—	40	70	mV	$I_Q = 5 \text{ mA to } 300 \text{ mA}$ ; $V_I = 6 \text{ V}$
Line regulation	$\Delta V_Q$	—	10	25	mV	$\Delta V_I = 12 \text{ V to } 32 \text{ V}$ $I_Q = 5 \text{ mA}$
Power supply ripple rejection	$PSRR$	—	60	—	dB	$f_r = 100 \text{ Hz}$ ; $V_r = 0.5 \text{ Vpp}$
Temperature output voltage drift	$dV_Q/dT$	—	0.5	—	mV/K	—

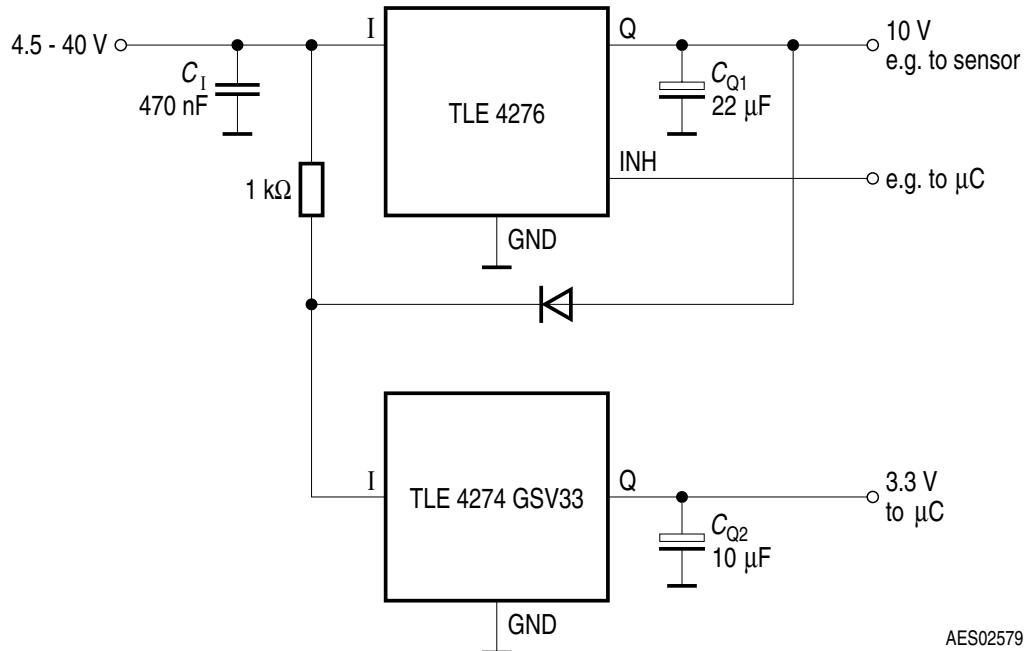
1) Measured when the output voltage  $V_Q$  has dropped 100 mV from the nominal value obtained at  $V_I = 6 \text{ V}$ .



**Figure 3 Measuring Circuit**



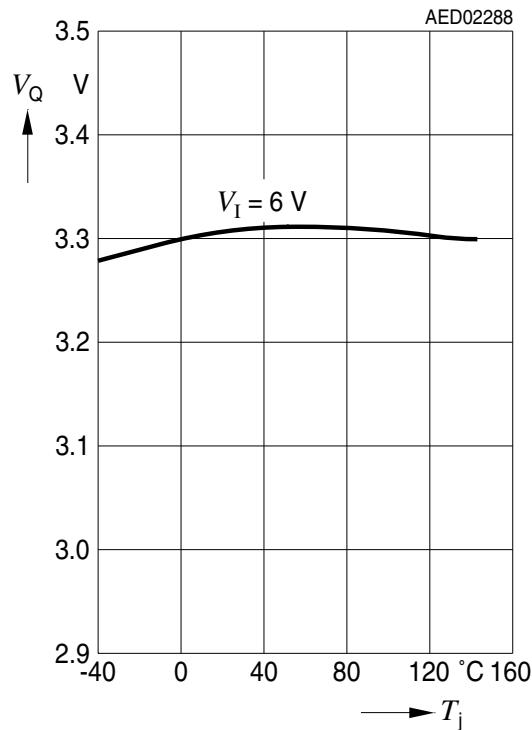
**Figure 4 Application Circuit**



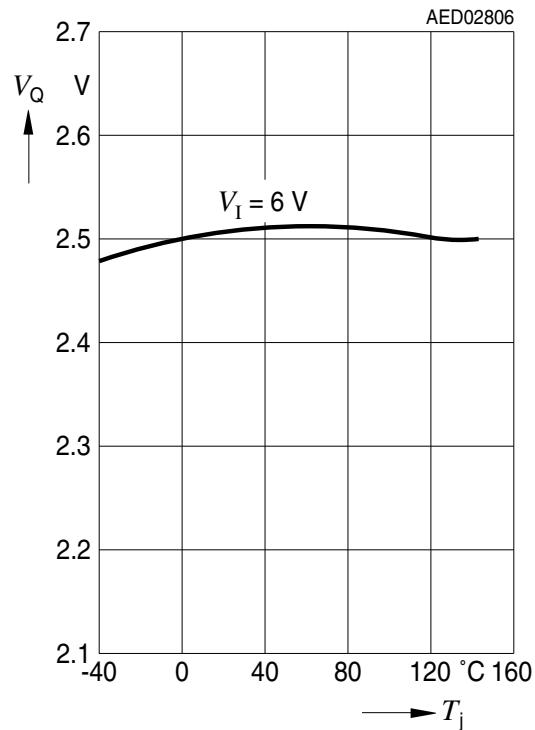
**Figure 5 Application Example**

## Typical Performance Characteristics

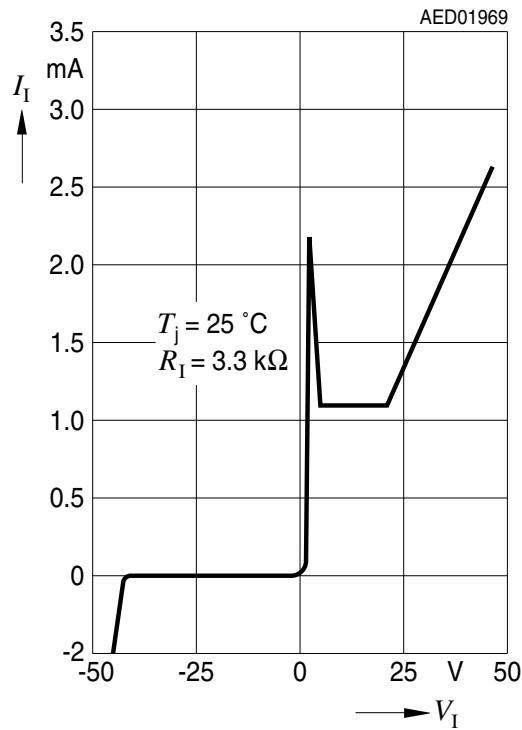
**Output Voltage  $V_Q$  versus  
Junction Temperature  $T_j$  (V33-Version)**



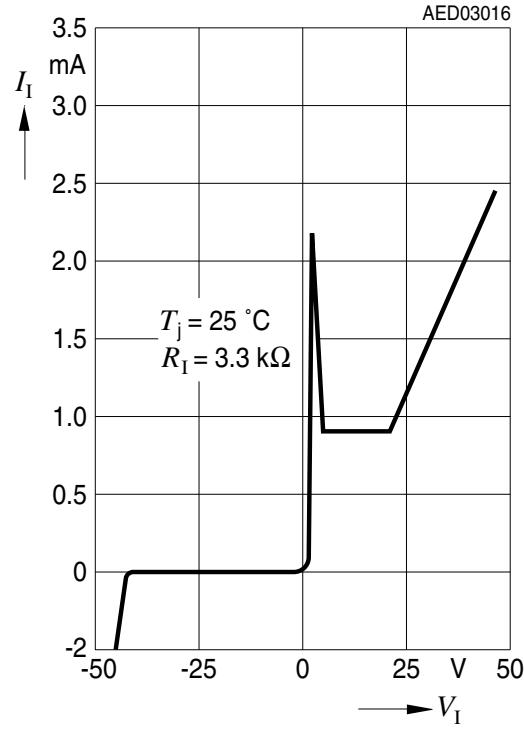
**Output Voltage  $V_Q$  versus  
Junction Temperature  $T_j$  (V25-Version)**



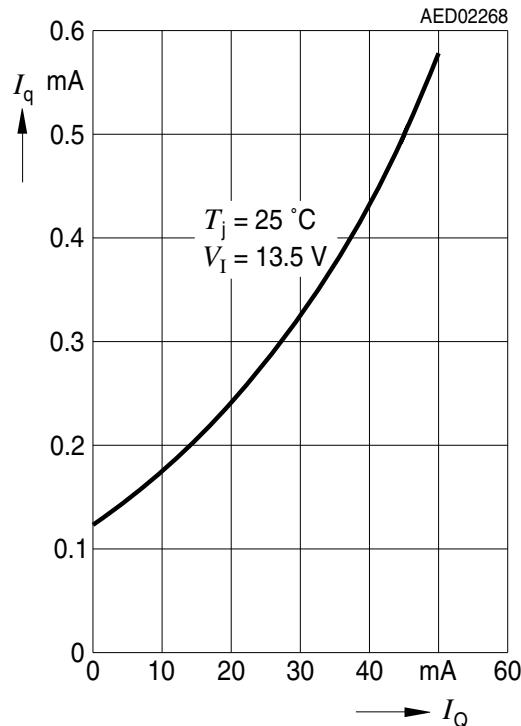
**Input Current  $I_I$  versus  
Input Voltage  $V_I$  (V33-Version)**



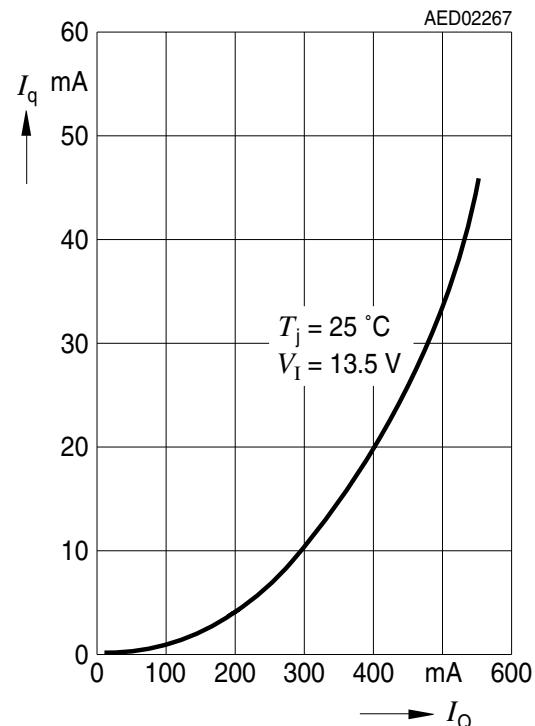
**Input Current  $I_I$  versus  
Input Voltage  $V_I$  (V25-Version)**



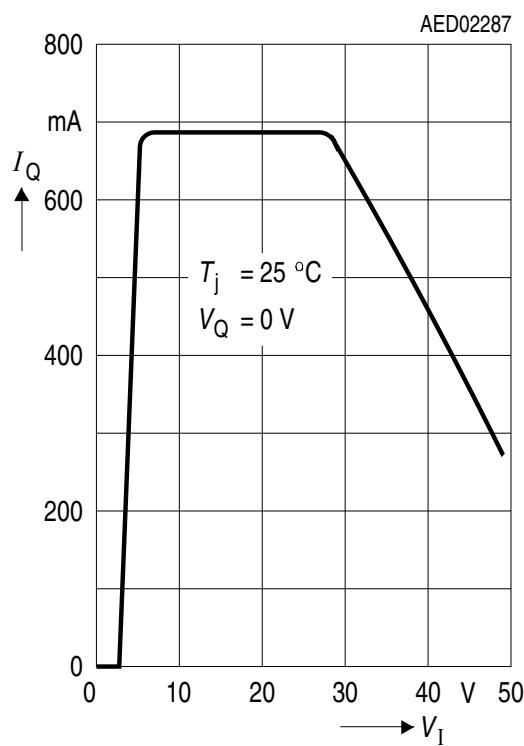
**Current Consumption  $I_q$  versus  
Output Current  $I_Q$  (low load)**



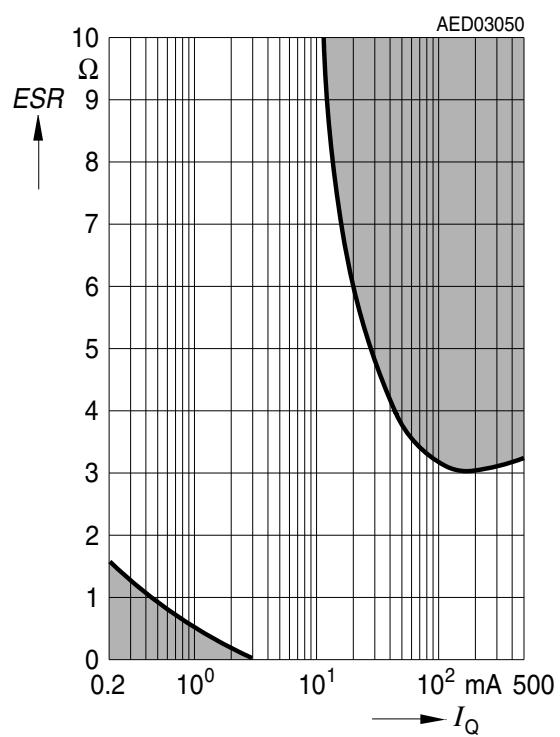
**Current Consumption  $I_q$  versus  
Output Current  $I_Q$  (high load)**



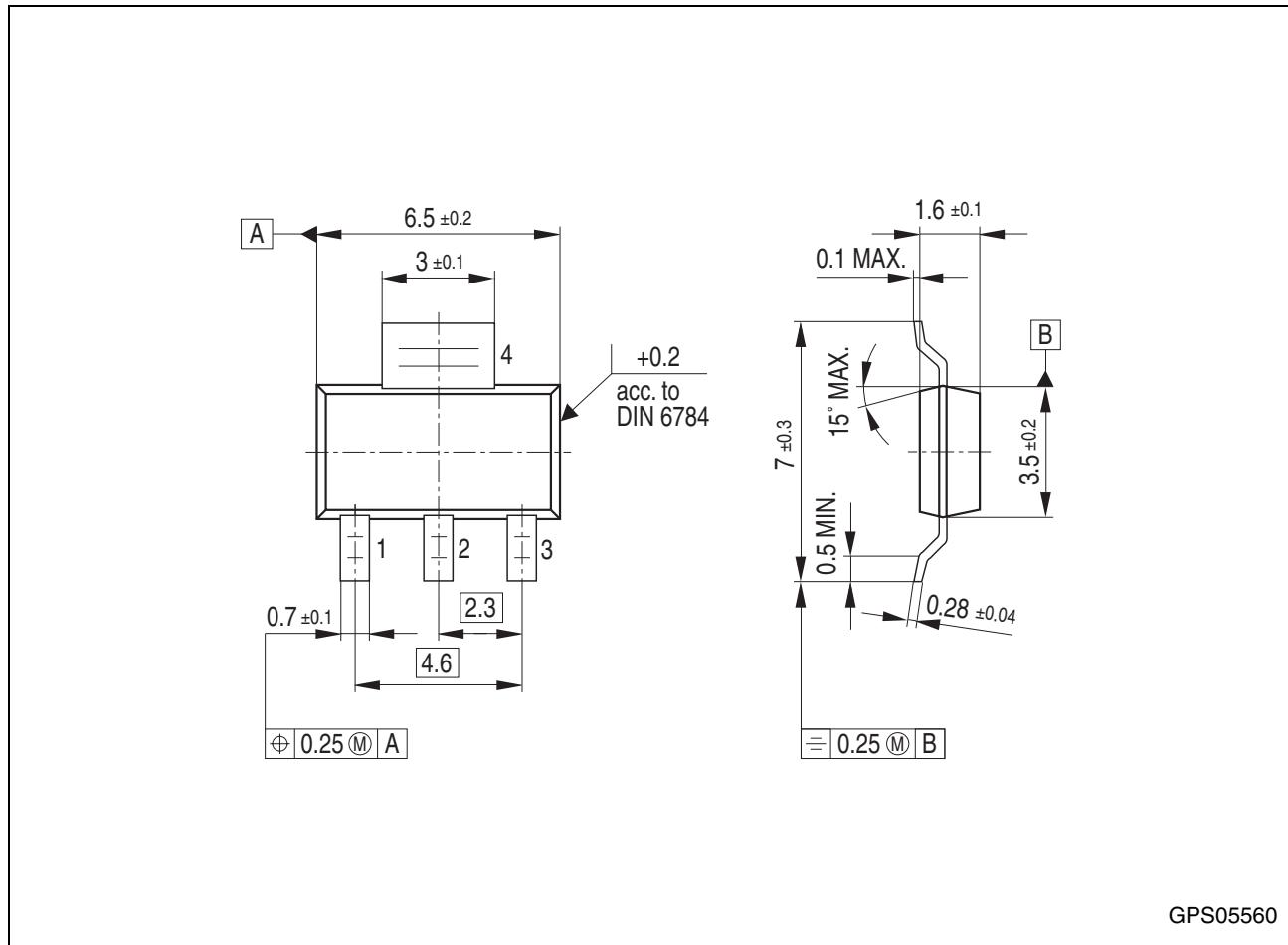
**Output Current  $I_Q$  versus  
Input Voltage  $V_I$**



**Region of Stability  
for  $C_Q = 10\text{ }\mu\text{F}$**



## Package Outlines



**Figure 6 PG-SOT223-4 (Plastic Small Outline Transistor)**

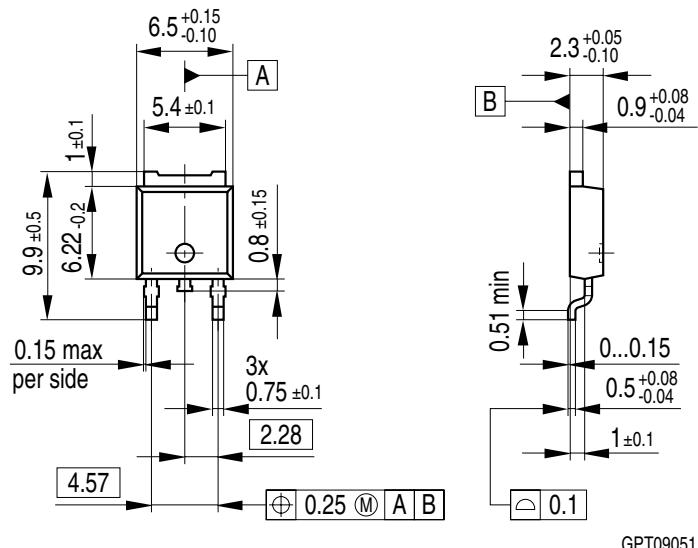
### Green Product (RoHS compliant)

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



All metal surfaces tin plated, except area of cut.

**Figure 7 PG-T0252-3-11 (Plastic Transistor Single Outline)**

### 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

---

**Revision History**

<b>Version</b>	<b>Date</b>	<b>Changes</b>
Rev. 2.3	2008-03-10	Simplified package name to PG-SOT223-4. No modification of released product.
Rev. 2.2	2007-03-20	Initial version of RoHS-compliant derivate of TLE 4274 / 3.3V;2.5V <b>Page 1</b> : AEC certified statement added <b>Page 1</b> and <b>Page 10</b> : RoHS compliance statement and Green product feature added <b>Page 1</b> and <b>Page 10</b> : Package changed to RoHS compliant version Legal Disclaimer updated

**Edition 2008-03-10**

**Published by**

**Infineon Technologies AG  
81726 Munich, Germany**

**© 2008 Infineon Technologies AG  
All Rights Reserved.**

#### **Legal Disclaimer**

The information given in this document shall in no event be regarded as a guarantee of conditions or characteristics. With respect to any examples or hints given herein, any typical values stated herein and/or any information regarding the application of the device, Infineon Technologies hereby disclaims any and all warranties and liabilities of any kind, including without limitation, warranties of non-infringement of intellectual property rights of any third party.

#### **Information**

For further information on technology, delivery terms and conditions and prices, please contact the nearest Infineon Technologies Office ([www.infineon.com](http://www.infineon.com)).

#### **Warnings**

Due to technical requirements, components may contain dangerous substances. For information on the types in question, please contact the nearest Infineon Technologies Office.

Infineon Technologies components may be used in life-support devices or systems only with the express written approval of Infineon Technologies, if a failure of such components can reasonably be expected to cause the failure of that life-support device or system or to affect the safety or effectiveness of that device or system. Life support devices or systems are intended to be implanted in the human body or to support and/or maintain and sustain and/or protect human life. If they fail, it is reasonable to assume that the health of the user or other persons may be endangered.