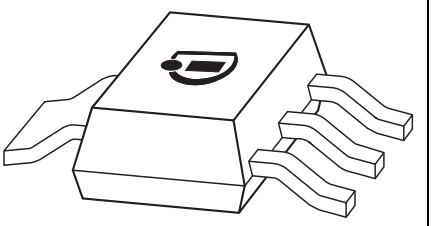
Low Drop Voltage Regulator

TLE 4266-2

Features

- Fixed output voltage 5.0 V or 3.3 V
- Output voltage tolerance ≤ ±2%, ±3%
- 150 mA current capability
- Very low current consumption
- Low-drop voltage
- Overtemperature protection
- Reverse polarity proof
- Wide temperature range
- Suitable for use in automotive electronics
- Inhibit



P-SOT223-4

Functional Description

The TLE 4266-2 is a monolithic integrated low-drop fixed voltage regulator which can supply loads up to 150 mA. It can be switched on and off by the $\overline{\text{INH}}$ pin. It is functional compatible to the TLE 4266, but with a reduced quiescent current of << 1 µA in OFF mode and 40 µA in ON mode. The TLE 4266-2 is especially designed for all applications that require very low quiescent current in ON and OFF mode. The device is available in the small surface mounted P-SOT223-4-7 package. It is pin compatible to the TLE 4266 G. It is designed to supply microprocessor systems under the severe condition of automotive applications and therefore it is equipped with additional protection against over load, short circuit and overtemperature. Of course the TLE 4266-2 can be used in other applications, where a stabilized voltage and the inhibit feature is required.

And input voltage V_I up to 45 V is regulated to V_Q = 5 V (TLE 4266-2 G) or V_Q = 3.3 V (TLE 4266-2 GSV33) with an accuracy of ±3%. For the 5 V device an accuracy of ±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 °C. A High level at the $\overline{\text{INH}}$ pin switches the regulator on.

Type	Ordering Code	Package
TLE 4266-2 G	Q67006-A9485	P-SOT223-4-7
TLE 4266-2 GSV33	Q67006-A9636	P-SOT223-4-7

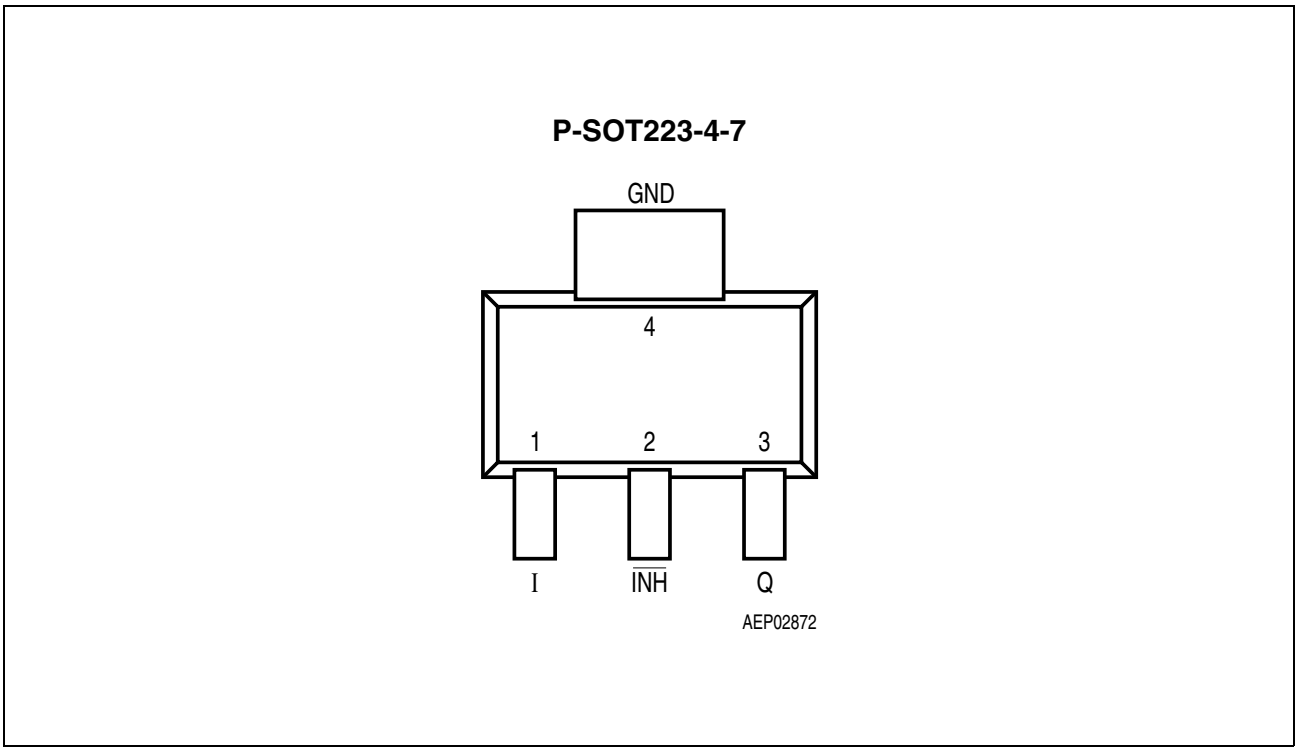


Figure 1 **Pin Configuration** (top view)

Table 1 **Pin Definitions and Functions TLE 4266-2 G, TLE 4266-2 GSV33**

Pin	Symbol	Function
1	I	**Input voltage;** block to ground directly at the IC with a ceramic capacitor.
2	$\overline{\text{INH}}$	**Inhibit input;** high level turns IC on, integrated pull-down resistor.
3	Q	**Output voltage;** block to ground with a capacitor $C_Q \geq 10$ µF, ESR ≤ 4 Ω
4	GND	**Ground**

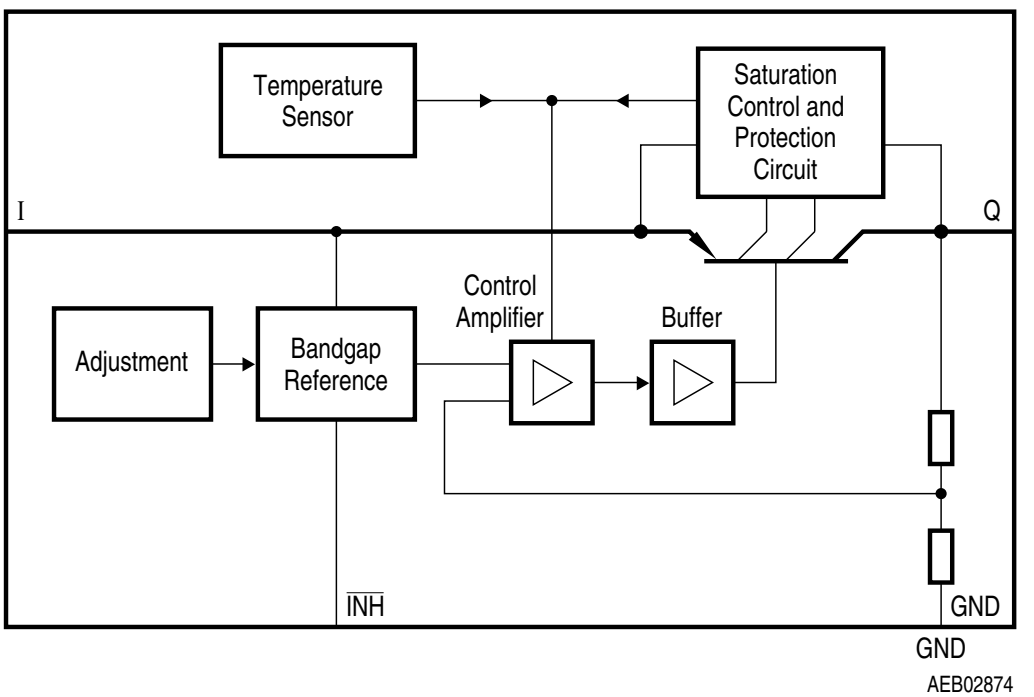


Figure 2 Block Diagram

Table 2 Absolute Maximum Ratings

T_j = -40 to 150 °C

Parameter	Symbol	Limit Values		Unit	Notes
		Min.	Max.		
Input I					
Voltage	V_I	-42	45	V	–
Current	I_I	–	–	–	internally limited
Inhibit $\overline{INH}$					
Voltage	$V_{\overline{INH}}$	-42	45	V	–
Output Q					
Voltage	V_Q	-0.3	32	V	–
Current	I_Q	–	–	–	internally limited
GND					
Current	I_{GND}	50	–	mA	–
Temperature					
Junction temperature	T_j	–	150	°C	–
Storage temperature	T_S	-50	150	°C	–
Thermal Resistance					
Junction ambient	$R_{thj\text{-}a}$	–	81	K/W	P-SOT223-4-7[1)]
Junction case	$R_{thj\text{-}pin4}$	–	18	K/W	P-SOT223-4-7
Operating Range					
Input voltage	V_I	5.5	45	V	TLE 4266-2 G
		4.4	45	V	TLE 4266-2 GSV33
Junction temperature	T_j	-40	150	°C	–

1) Worst case, regarding peak temperature; zero airflow; mounted an a PCB 80 × 80 × 1.5 mm^3, heat sink area 300 mm^2.

Table 3 Characteristics

V_I = 13.5 V; $V_{\overline{INH}}$ = 5 V; -40 °C ≤ T_j ≤ 125 °C unless otherwise specified

Parameter	Symbol	Limit Values			Unit	Test Condition
		Min.	Typ.	Max.		
Output voltage	V_Q	4.85	5.0	5.15	V	TLE 4266-2 G; 5 mA ≤ I_Q ≤ 100 mA; 6 V ≤ V_I ≤ 21 V
		4.9	5.0	5.1	V	TLE 4266-2 G; 5 mA ≤ I_Q ≤ 50 mA; 9 V ≤ V_I ≤ 16 V
Output voltage	V_Q	3.20	3.30	3,40	V	TLE 4266-2 GSV33; 5 mA ≤ I_Q ≤ 100 mA; 6 V ≤ V_I ≤ 21 V
Output-current limitation	I_Q	150	200	500	mA	–
Current consumption $I_q = I_I - I_Q$	I_q	–	0	1	µA	$V_{\overline{INH}}$ = 0 V; T_j ≤ 100 °C
Current consumption $I_q = I_I - I_Q$	I_q	–	40	60	µA	I_Q = 100 µA; T_j ≤ 85 °C
		–	40	70	µA	I_Q = 100 µA
Current consumption $I_q = I_I - I_Q$	I_q	–	1.7	4	mA	I_Q = 50 mA
Drop voltage	V_{Dr}	–	0.25	0.5	V	TLE 4266-2 G; I_Q = 100 mA[1)]
Drop voltage	V_{Dr}	–	1.00	1.10	V	TLE 4266-2 GSV33; I_Q = 100 mA[2)]
Load regulation	ΔV_Q	–	50	90	mV	TLE 4266-2 G; I_Q = 1 to 100 mA; V_I = 6 V
Load regulation	ΔV_Q	–	35	60	mV	TLE 4266-2 GSV33; I_Q = 1 to 100 mA; V_I = 6 V
Line regulation	ΔV_Q	–	5	30	mV	TLE 4266-2 G; V_I = 6 V to 28 V; I_Q = 1 mA
Line regulation	ΔV_Q	–	4	20	mV	TLE 4266-2 GSV33; V_I = 6 V to 28 V; I_Q = 1 mA

Table 3 Characteristics (cont'd)

V_I = 13.5 V; $V_{\overline{INH}}$ = 5 V; -40 °C ≤ T_j ≤ 125 °C unless otherwise specified

Parameter	Symbol	Limit Values			Unit	Test Condition
		Min.	Typ.	Max.		
Power Supply Ripple Rejection	$PSRR$	–	68	–	dB	f_r = 100 Hz; V_r = 0.5 Vpp
Output Capacitor	C_Q	10	–	–	µF	ESR ≤ 4 Ω at 10 kHz
Inhibit						
Inhibit on voltage	$V_{\overline{INH},\ on}$	3.5	–	–	V	–
Inhibit off voltage	$V_{\overline{INH},\ off}$	–	–	0.8	V	–
Inhibit current	$I_{\overline{INH}}$	–	4	8	µA	$V_{\overline{INH}}$ = 5 V
Pull-down resistor	$R_{\overline{INH}}$	–	1.0	–	MΩ	see $I_{\overline{INH}}$

1) Drop voltage = V_I - V_Q (measured when the output voltage V_Q has dropped 100 mV from the nominal value obtained at V_I = 13.5 V).

2) Drop voltage = V_I - V_Q (measured when the output voltage V_Q has dropped 100 mV from the nominal value obtained at V_I = 13.5 V).

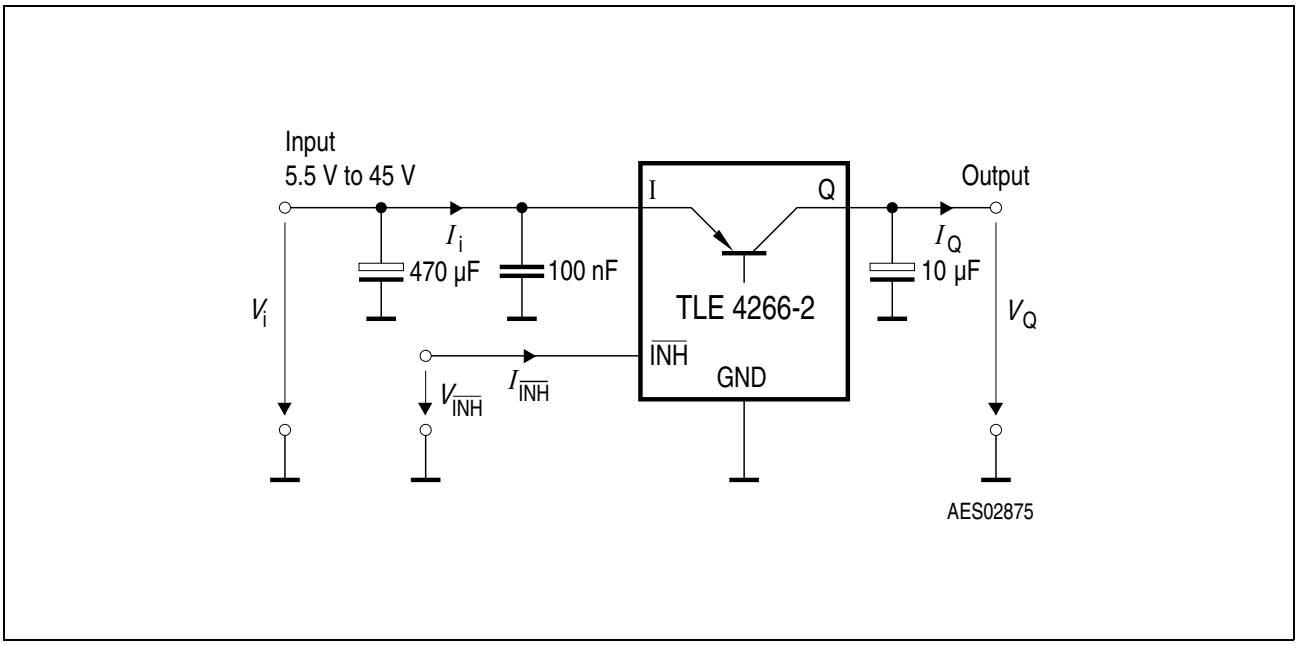


Figure 3 Measuring Circuit

Circuit Description and Application Information

In the TLE 4266-2 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 ±2% at an input voltage up to 45 V. The minimum required input voltage is V_Q + V_{dr} with a drop voltage V_{dr} of max. 0.5 V (see **"Typical Performance Characteristics" on Page 8**) in case of the TLE 4266-2 G. The TLE 4266-2 GSV33 requires a minimum input voltage of 4.4 V.

The TLE 4266-2 can supply up to 150 mA. However for protection reasons at high input voltage above 25 V, the maximum output current is reduced (SOA protection).

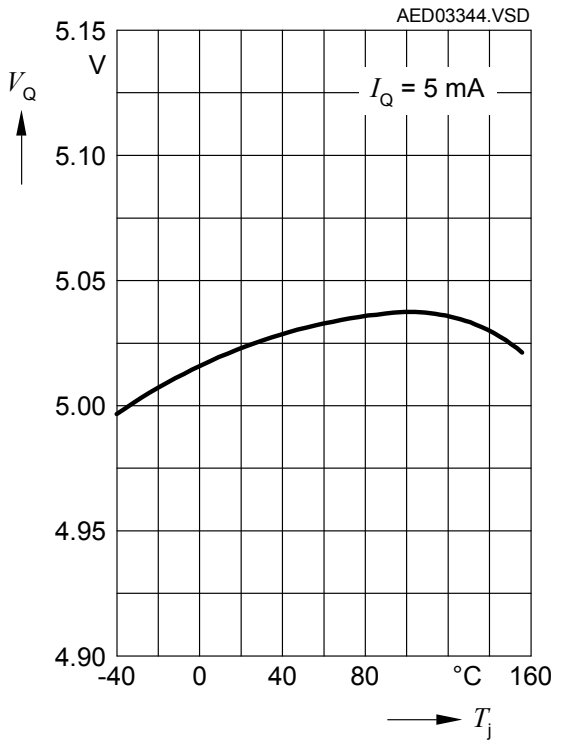
Figure 3 shows a typical measuring circuit. For stability of the control loop the TLE 4266-2 output requires an output capacitor C_Q of at least 10 µF with a maximum permissible ESR of 4 Ω. Tantalum as well as multi layer ceramic capacitors are suitable.

At the input of the regulator an input capacitor is necessary for compensating line influences (100 nF ceramic capacitor recommended). A resistor of approx. 1 Ω in series with C_I, can damp any oscillation occuring due the input inductivity and the input capacitor. In the measuring circuit shown in **Figure 3** an additional electrolytic input capacitor of 470 µF 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.

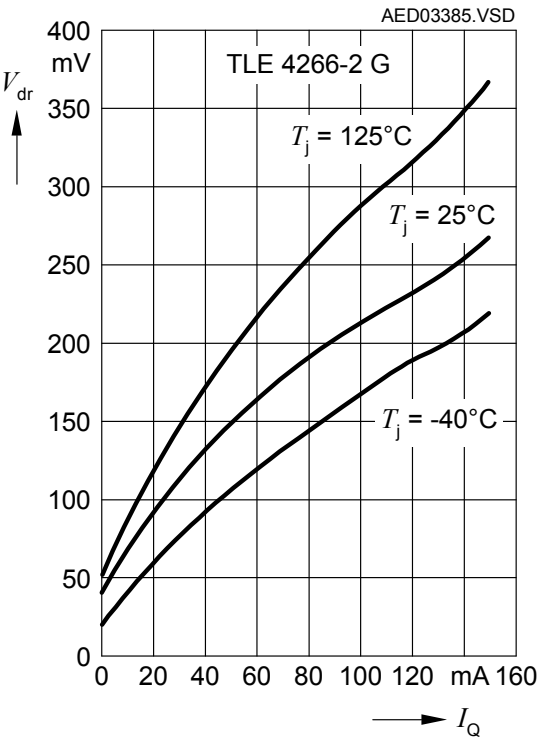
The TLE 4266-2 includes the Inhibit function. For a voltage above 3.5 V at the $\overline{INH}$ pin the regulator is switched on.

Typical Performance Characteristics

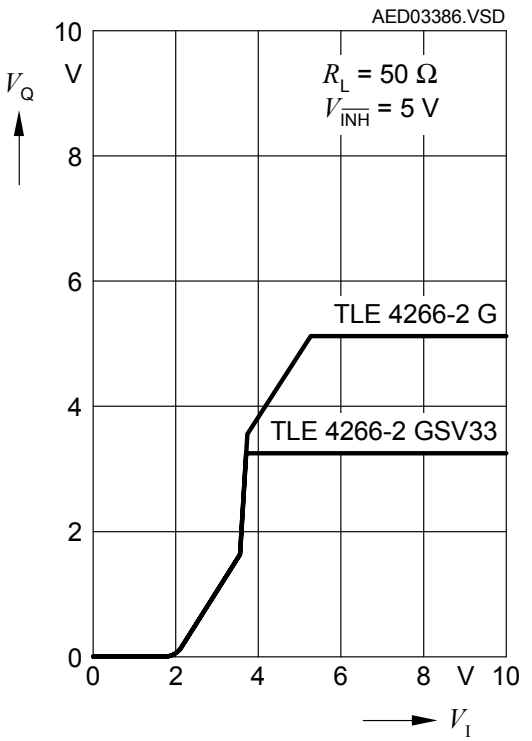
Output Voltage V_Q versus Junction Temperature T_j



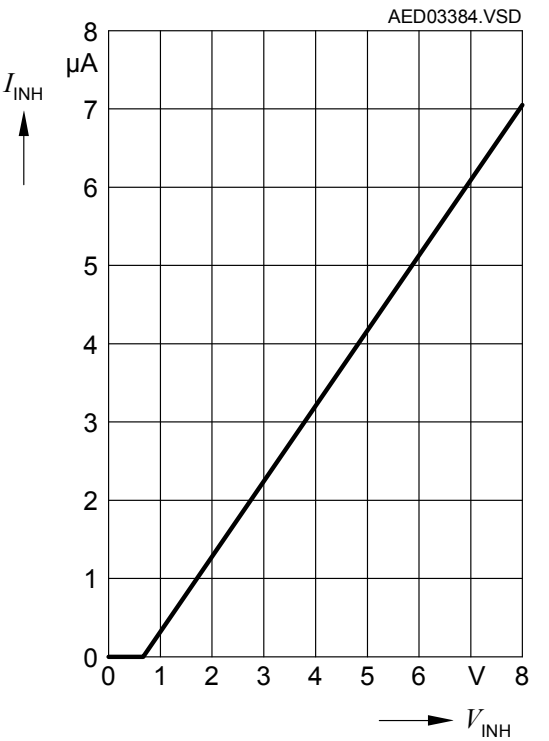
Drop Voltage V_{dr} versus Output Current I_Q (TLE 4266-2 G)



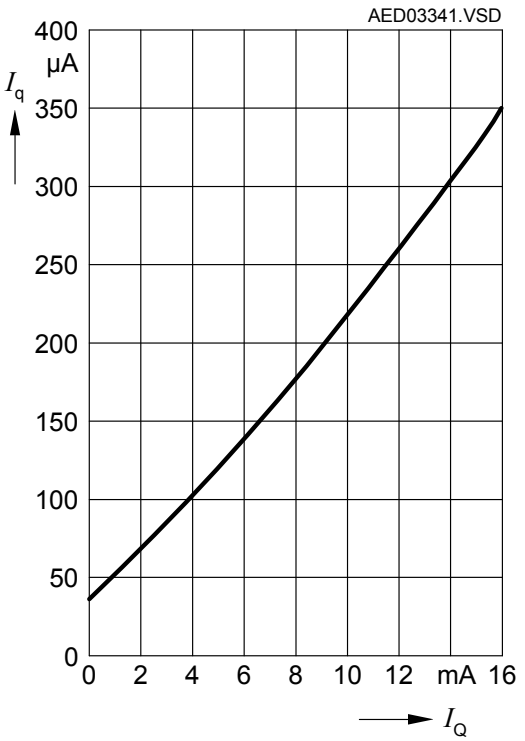
Output Voltage V_Q versus Input Voltage V_I



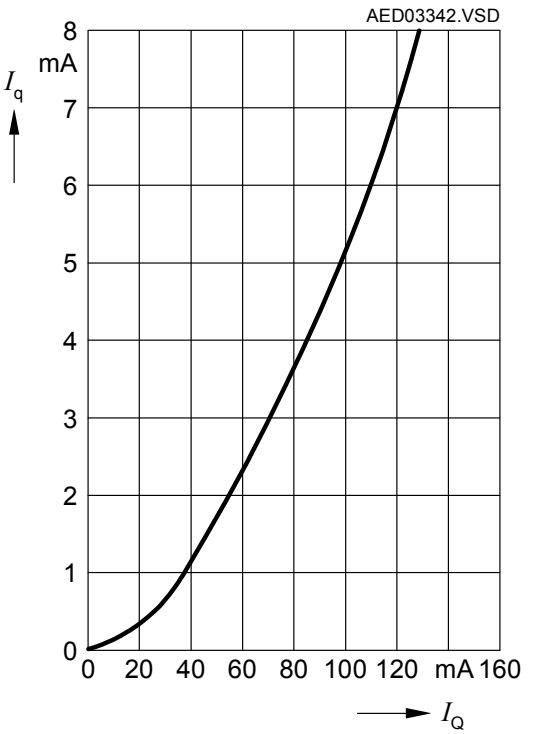
Inhibit Current $I_{\overline{INH}}$ versus Inhibit Voltage $V_{\overline{INH}}$



Current Consumption I_q versus Output Current I_Q



Current Consumption I_q versus Output Current I_Q



Package Outlines

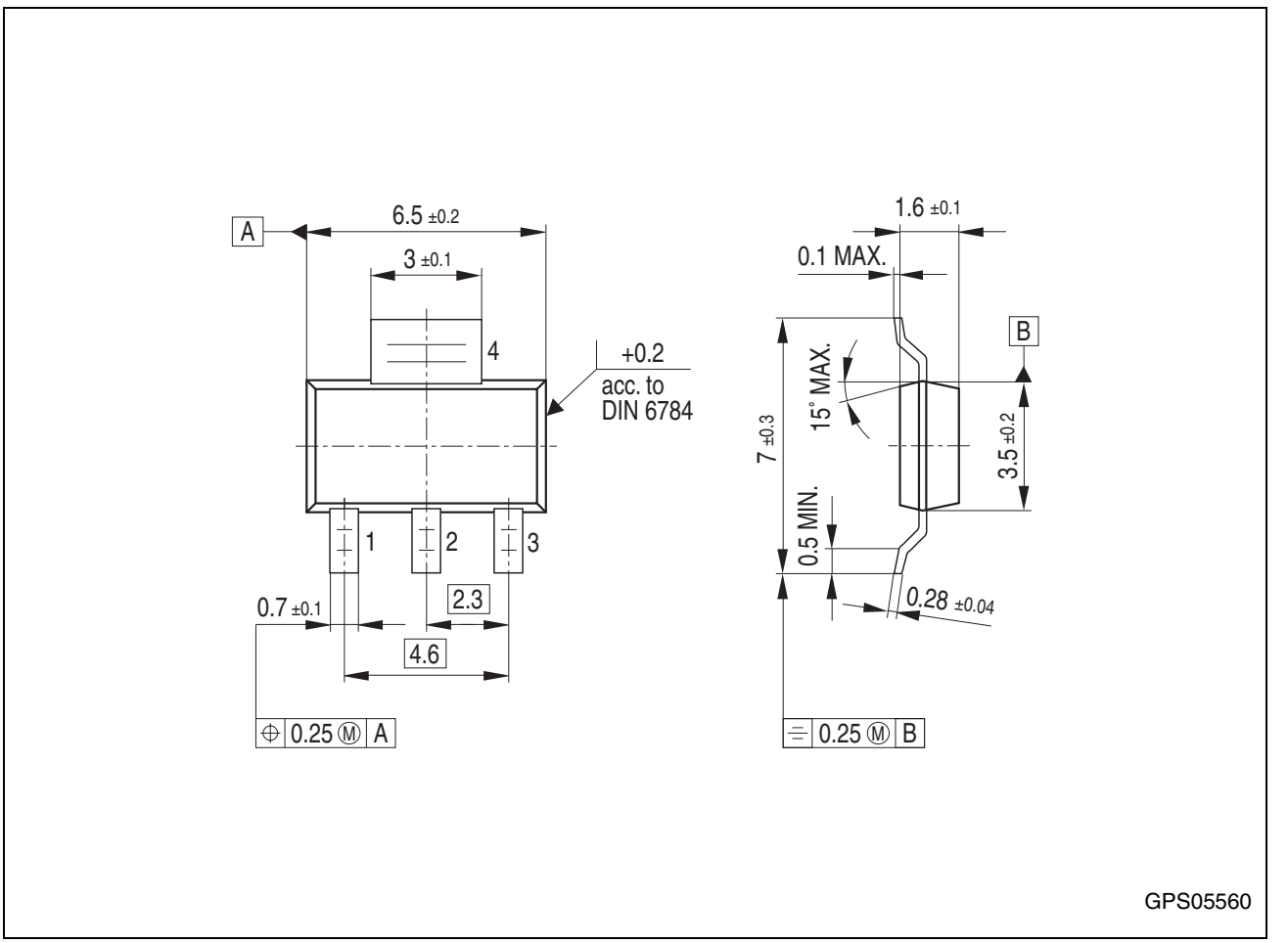


Figure 4 **P-SOT223-4-7** (Plastic Small Outline Transistor)

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

Edition 2004-01-01

Published by Infineon Technologies AG,
St.-Martin-Strasse 53,
81669 München, Germany

Attention please!

The information herein is given to describe certain components and shall not be considered as a guarantee of characteristics.

Terms of delivery and rights to technical change reserved.

We hereby disclaim any and all warranties, including but not limited to warranties of non-infringement, regarding circuits, descriptions and charts stated herein.

Information

For further information on technology, delivery terms and conditions and prices please contact your nearest Infineon Technologies Office (**www.infineon.com**).

Warnings

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

Infineon Technologies Components may only be used in life-support devices or systems 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.