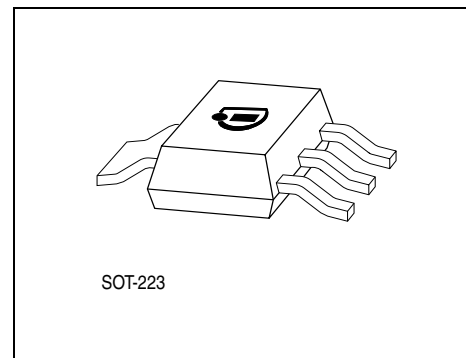


## Low-Drop Voltage Regulator

## TLE 4266-2

### Features

- Fixed output voltage 5.0V or 3.3V
- Output voltage tolerance  $\leq \pm 2\%$ ,  $\pm 3\%$
- 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



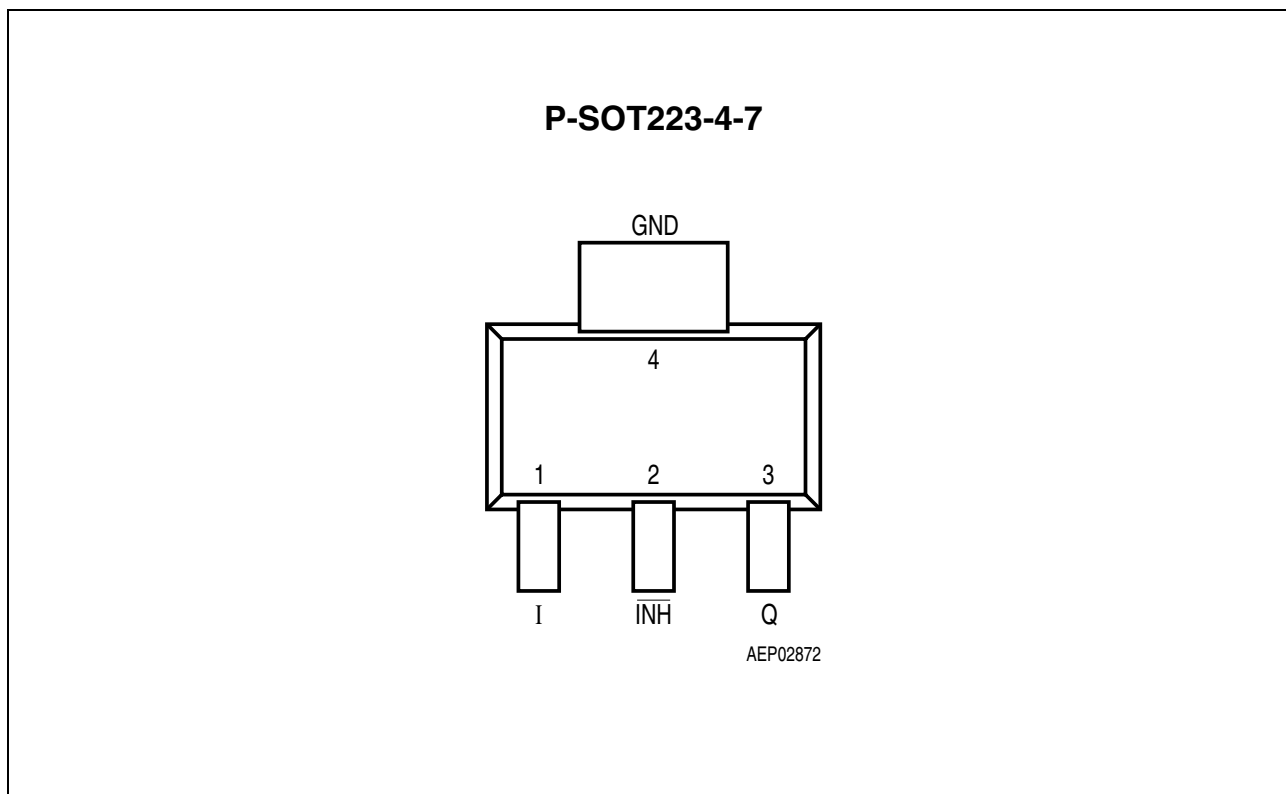
Type	Ordering Code	Package
TLE 4266-2 G	Q67006-A9485	P-SOT223-4-7
TLE 4266-2 GSV33	Q67006-A9636	P-SOT223-4-7

### 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  $< 1 \mu\text{A}$  in OFF mode and  $40 \mu\text{A}$  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-SOT223-4-2 package. It is pin compatible to the TLE 4266G. 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  $V_O = 5 \text{ V}$  (TLE 4266-2 G) or  $V_O = 3.3 \text{ V}$  (TLE 4266-2 GSV33) with an accuracy of  $\pm 3\%$ . For the 5V device an accuracy of  $\pm 2\%$  is kept for a load current range up to 50 mA.

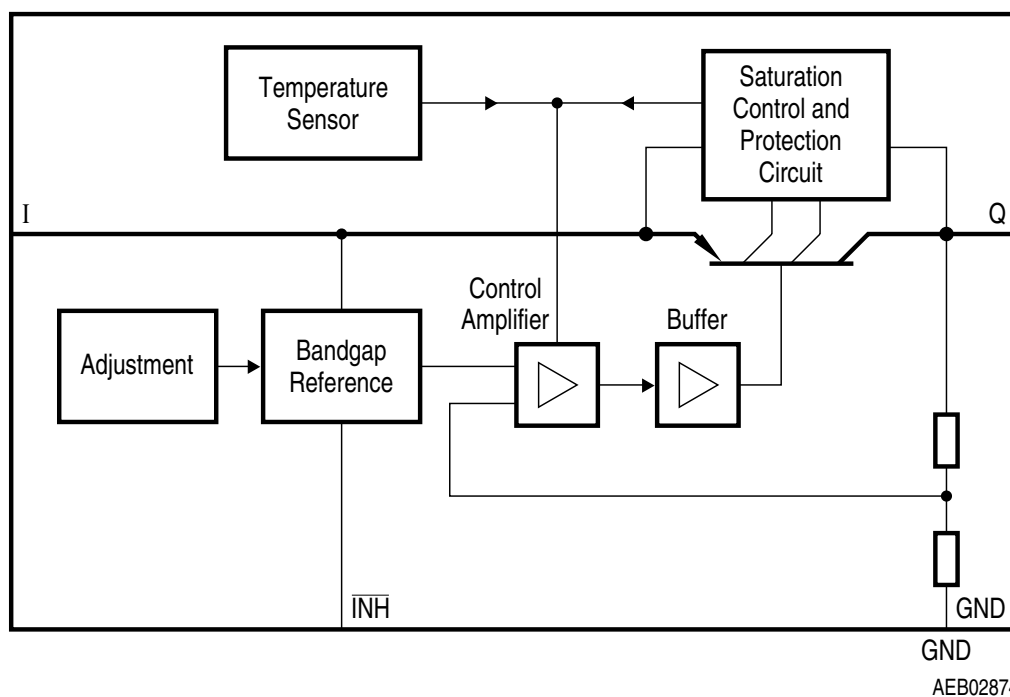
The device operates in the temperature range of  $T_j = -40$  to  $150^\circ\text{C}$ . A High level at the  $\overline{\text{INH}}$  pin switches the regulator on.



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

#### Pin Definitions and Functions TLE 4266-2 G, TLE 4266-2 GSV33

Pin	Symbol	Function
1	I	<b>Input voltage;</b> block to ground directly at the IC with a ceramic capacitor.
2	$\overline{\text{INH}}$	<b>Inhibit input;</b> high level turns IC on, integrated pull down resistor.
3	Q	<b>Output voltage;</b> block to ground with a capacitor $C_Q \geq 10 \mu\text{F}$ , $\text{ESR} \leq 4 \Omega$
4	GND	<b>Ground</b>



**Figure 2      Block Diagram**

**Absolute Maximum Ratings**
 $T_j = -40 \text{ to } 150 \text{ }^{\circ}\text{C}$ 

Parameter	Symbol	Limit Values		Unit	Notes
		min.	max.		

**Input I**

Voltage	$V_I$	- 42	45	V	–
Current	$I_I$	–	–	–	internally limited

**Inhibit  $\overline{\text{INH}}$** 

Voltage	$V_{\overline{\text{INH}}}$	- 42	45	V	–
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**Output Q**

Voltage	$V_Q$	- 0.3	32	V	–
Current	$I_Q$	–	–	–	internally limited

**GND**

Current	$I_{\text{GND}}$	50	–	mA	–
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**Absolute Maximum Ratings**
 $T_j = -40 \text{ to } 150 \text{ }^{\circ}\text{C}$ 

Parameter	Symbol	Limit Values		Unit	Notes
		min.	max.		

**Temperature**

Junction temperature	$T_j$	–	150	$^{\circ}\text{C}$	–
Storage temperature	$T_s$	– 50	150	$^{\circ}\text{C}$	–

**Thermal Resistance**

Junction ambient	$R_{thj-a}$	–	81	K/W	P-SOT223-4-7 <sup>1)</sup>
Junction case	$R_{thj-pin4}$	–	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	$^{\circ}\text{C}$	–

<sup>1)</sup> Worst case, regarding peak temperature; zero airflow; mounted on a PCB  $80 \times 80 \times 1.5 \text{ mm}^3$ , heat sink area  $300 \text{ mm}^2$ .

**Characteristics**
 $V_i = 13.5 \text{ V}; V_{\text{INH}} = 5 \text{ V}; -40 \text{ }^{\circ}\text{C} \leq T_j \leq 125 \text{ }^{\circ}\text{C}$  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 $5 \text{ mA} \leq I_Q \leq 100 \text{ mA}$ $6 \text{ V} \leq V_i \leq 21 \text{ V}$
		4.9	5.0	5.1	V	TLE 4266-2 G $5 \text{ mA} \leq I_Q \leq 50 \text{ mA}$ $9 \text{ V} \leq V_i \leq 16 \text{ V}$
Output voltage	$V_Q$	3.20	3.30	3.40	V	TLE 4266-2 GSV33 $5 \text{ mA} \leq I_Q \leq 100 \text{ mA}$ $6 \text{ V} \leq V_i \leq 21 \text{ V}$
Output-current limitation	$I_Q$	150	200	500	mA	–
Current consumption $I_q = I_i - I_Q$	$I_q$	–	0	1	$\mu\text{A}$	$V_{\text{INH}} = 0 \text{ V}; T_j \leq 100 \text{ }^{\circ}\text{C}$
Current consumption $I_q = I_i - I_Q$	$I_q$	–	40	60	$\mu\text{A}$	$I_Q = 100 \text{ } \mu\text{A},$ $T_j \leq 85 \text{ }^{\circ}\text{C}$
		–	40	70	$\mu\text{A}$	$I_Q = 100 \text{ } \mu\text{A},$
Current consumption $I_q = I_i - I_Q$	$I_q$	–	1.7	4	mA	$I_Q = 50 \text{ mA}$
Drop voltage	$V_{\text{Dr}}$	–	0.25	0.5	V	TLE 4266-2 G; $I_Q = 100 \text{ mA}^{1)}$
Drop voltage	$V_{\text{Dr}}$	–	1.00	1.10	V	TLE 4266-2 GSV33; $I_Q = 100 \text{ mA}^{2)}$
Load regulation	$\Delta V_Q$	–	50	90	mV	TLE 4266-2 G $I_Q = 1 \text{ to } 100 \text{ mA}$ $V_i = 6 \text{ V}$
Load regulation	$\Delta V_Q$	–	35	60	mV	TLE 4266-2 GSV33 $I_Q = 1 \text{ to } 100 \text{ mA}$ $V_i = 6 \text{ V}$

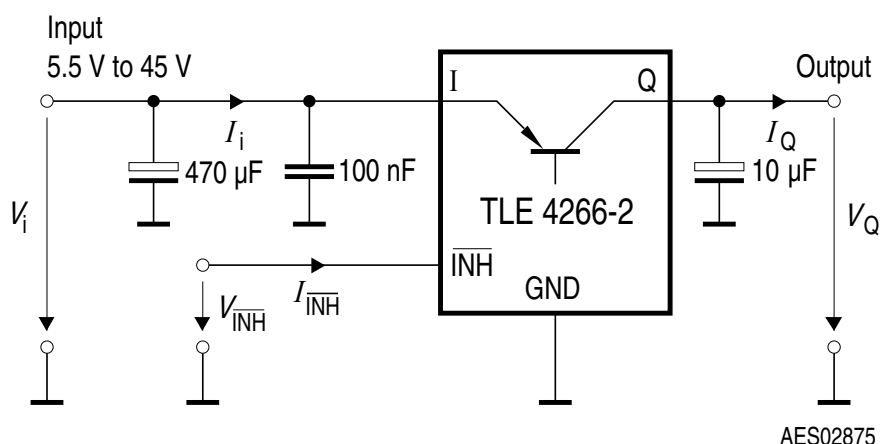
**Characteristics**
 $V_i = 13.5 \text{ V}; V_{\text{INH}} = 5 \text{ V}; -40 \text{ }^\circ\text{C} \leq T_j \leq 125 \text{ }^\circ\text{C}$  unless otherwise specified

Parameter	Symbol	Limit Values			Unit	Test Condition
		min.	typ.	max.		
Line regulation	$\Delta V_Q$	–	5	30	mV	TLE 4266-2 G $V_i = 6 \text{ V to } 28 \text{ V}$ $I_Q = 1 \text{ mA}$
Line regulation	$\Delta V_Q$	–	4	20	mV	TLE 4266-2 GSV33 $V_i = 6 \text{ V to } 28 \text{ V}$ $I_Q = 1 \text{ mA}$
Power Supply Ripple Rejection	$PSRR$	–	68	–	dB	$f_r = 100 \text{ Hz}, V_r = 0.5 V_{pp}$
Output Capacitor	$C_Q$	10	–	–	$\mu\text{F}$	$ESR \leq 4 \text{ } \Omega \text{ at } 10 \text{ kHz}$

**Inhibit**

Inhibit on voltage	$V_{\text{INH, on}}$	3.5	–	–	V	–
Inhibit off voltage	$V_{\text{INH, off}}$	–	–	0.8	V	–
Inhibit current	$I_{\text{INH}}$	–	4	8	$\mu\text{A}$	$V_{\text{INH}} = 5 \text{ V}$
Pull down resistor	$R_{\text{INH}}$	–	1.0	–	M $\Omega$	see $I_{\text{INH}}$

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



**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  $\pm 2\%$  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. 0.5V(see Fig. page 9) in case of the TLE 4266-2 G. The TLE 4266-2 GSV33 requires a minimum input voltage of 4.4V.

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).

Fig. 3 shows a typical application circuit. For stability of the control loop the TLE 4266-2 output requires an output capacitor  $C_Q$  of at least 10  $\mu\text{F}$  with a maximum permissible ESR of 4  $\Omega$ . Tantalum as well as multi layer ceramic capacitors are suitable.

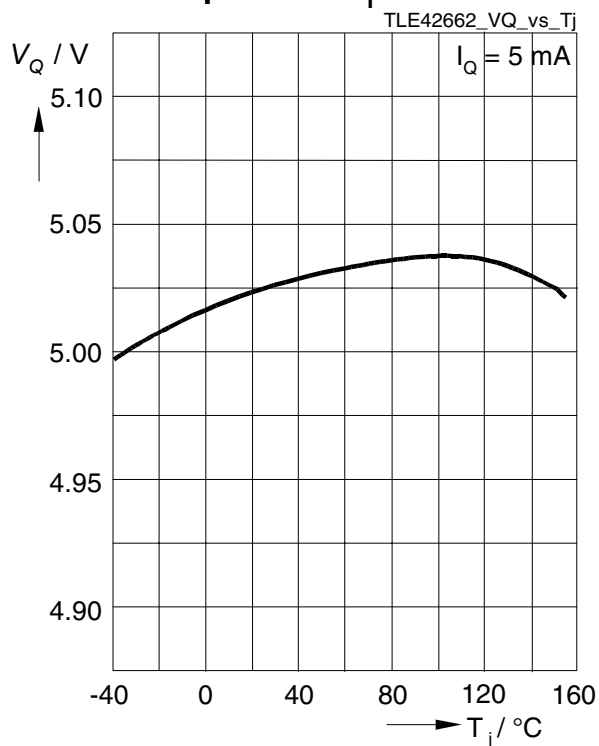
At the input of the regulator an input capacitor is necessary for compensating line influences (100 nF ceramic capacitor recommended). A resistor of approx. 1  $\Omega$  in series with  $C_i$ , can damp any oscillation occurring due the input inductivity and the input capacitor. In the application circuit shown in Fig. 4 an additional electrolytic input capacitor of 470  $\mu\text{F}$  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 4266-2 includes the Inhibit function. For a voltage above 3.5 V at the  $\overline{\text{INH}}$  pin the regulator is switched on.

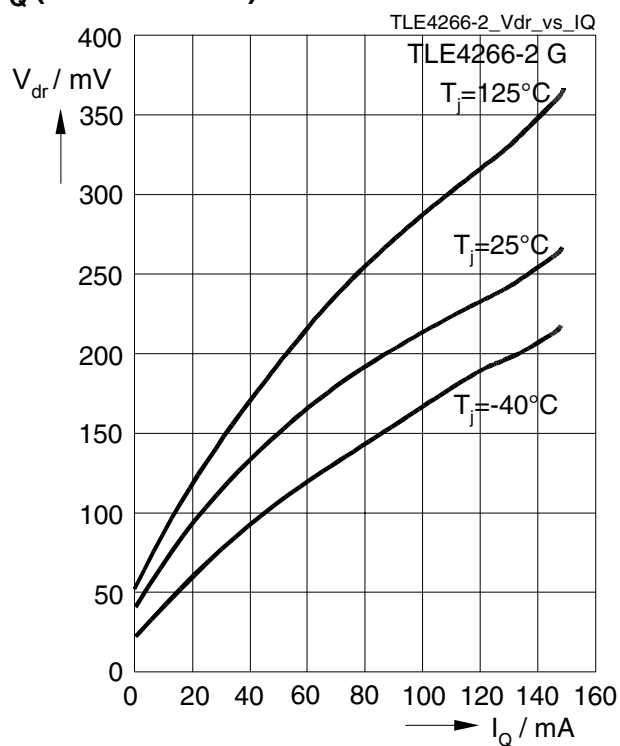


## Typical Performance Characteristics

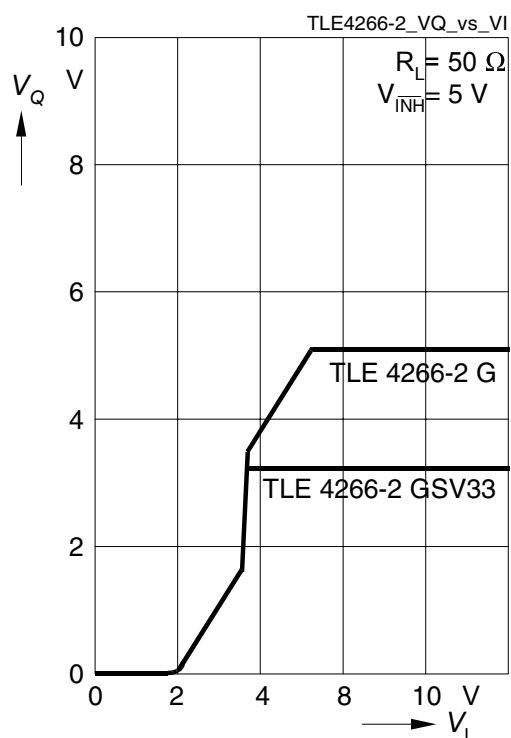
**Output Voltage versus  $V_Q$  versus Junction Temperature  $T_j$**



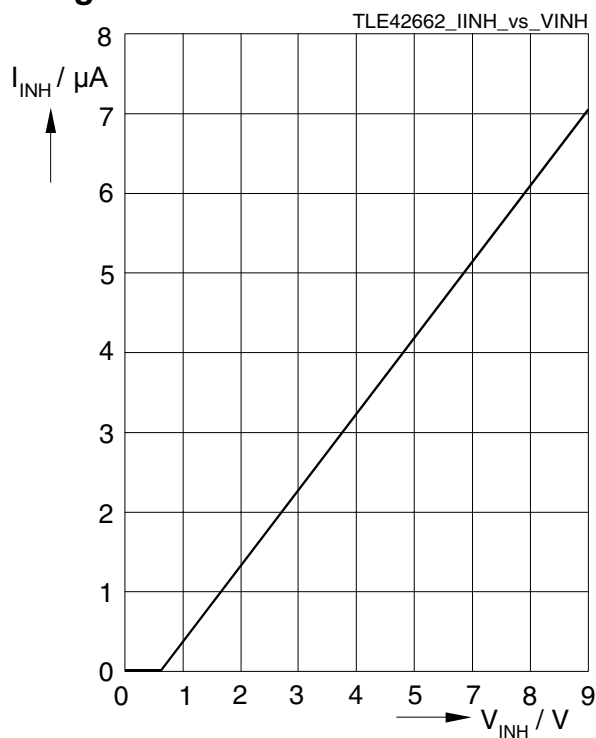
**Drop Voltage  $V_{dr}$  versus Output Current  $I_Q$  (TLE4266-2 G)**



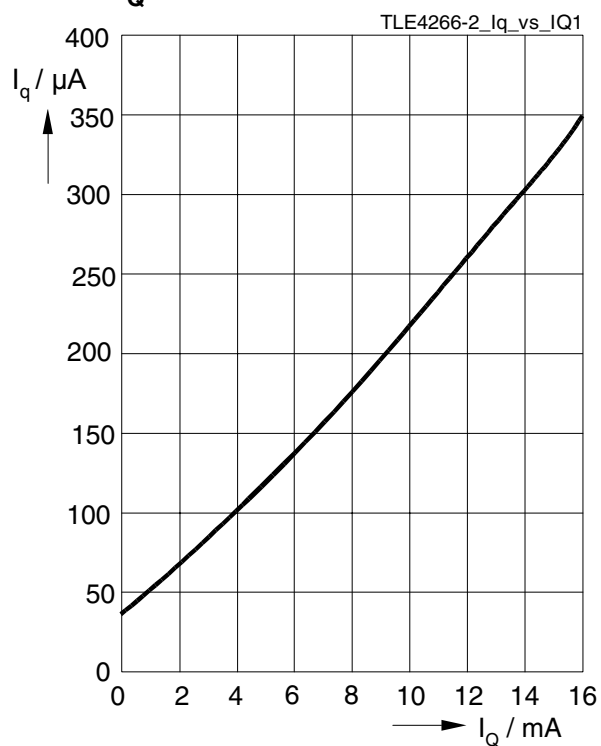
**Output Voltage  $V_Q$  versus Input Voltage  $V_I$**



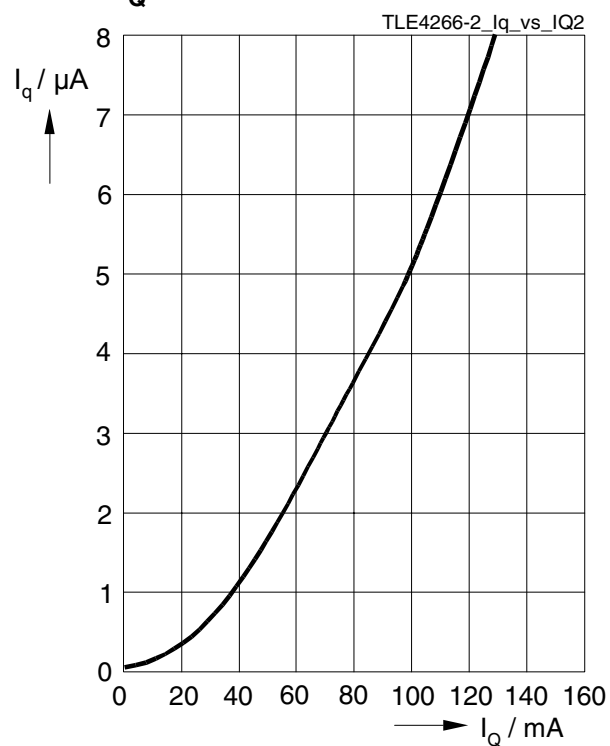
**Inhibit Current  $I_{INH}$  versus Inhibit Voltage**



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



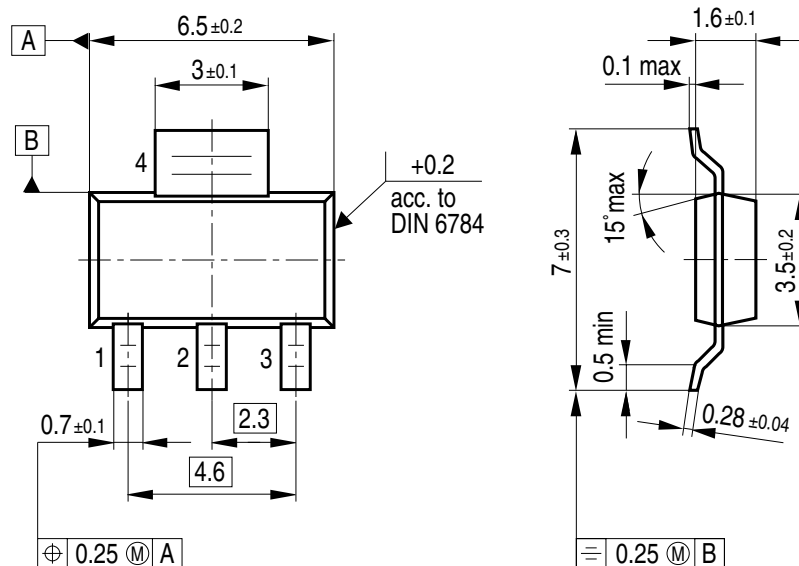
**Current Consumption  $I_q$  versus Output Current  $I_Q$**



## Package Outlines

### P-SOT223-4-7

(Plastic Small Outline Transistor)



Weight approx. 0.15 g

GPS05560

**Edition 2002-12-16**

**Published by Infineon Technologies AG,  
St.-Martin-Strasse 53,  
D-81541 München, Germany**

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