

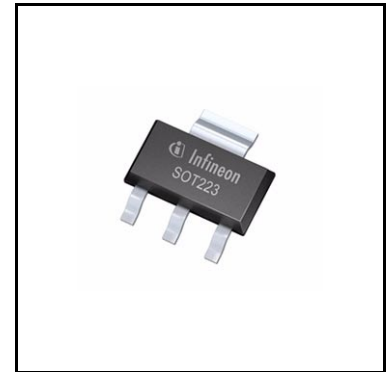
# OPTIREG™ Linear TLE4266-2G

## Low drop voltage regulator



### Features

- Fixed output voltage 5.0 V or 3.3 V
- 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
- Green Product (RoHS compliant)



### Potential applications

General automotive applications.

### Product validation

Qualified for automotive applications. Product validation according to AEC-Q100/101.

### Description

The OPTIREG™ Linear TLE4266-2G 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 TLE4266, but with a reduced quiescent current of  $\ll 1 \mu\text{A}$  in OFF mode and  $40 \mu\text{A}$  in ON mode. The TLE4266-2G 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 PG-SOT223-4 package. It is pin compatible to the TLE4266G. 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 TLE4266-2G can be used in other applications, where a stabilized voltage and the inhibit feature is required.

And input voltage  $V_1$  up to 45 V is regulated to  $V_O = 5 \text{ V}$  (TLE4266-2G) or  $V_O = 3.3 \text{ V}$  (TLE4266-2GSV33) with an accuracy of  $\pm 3\%$ . For the 5 V 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.

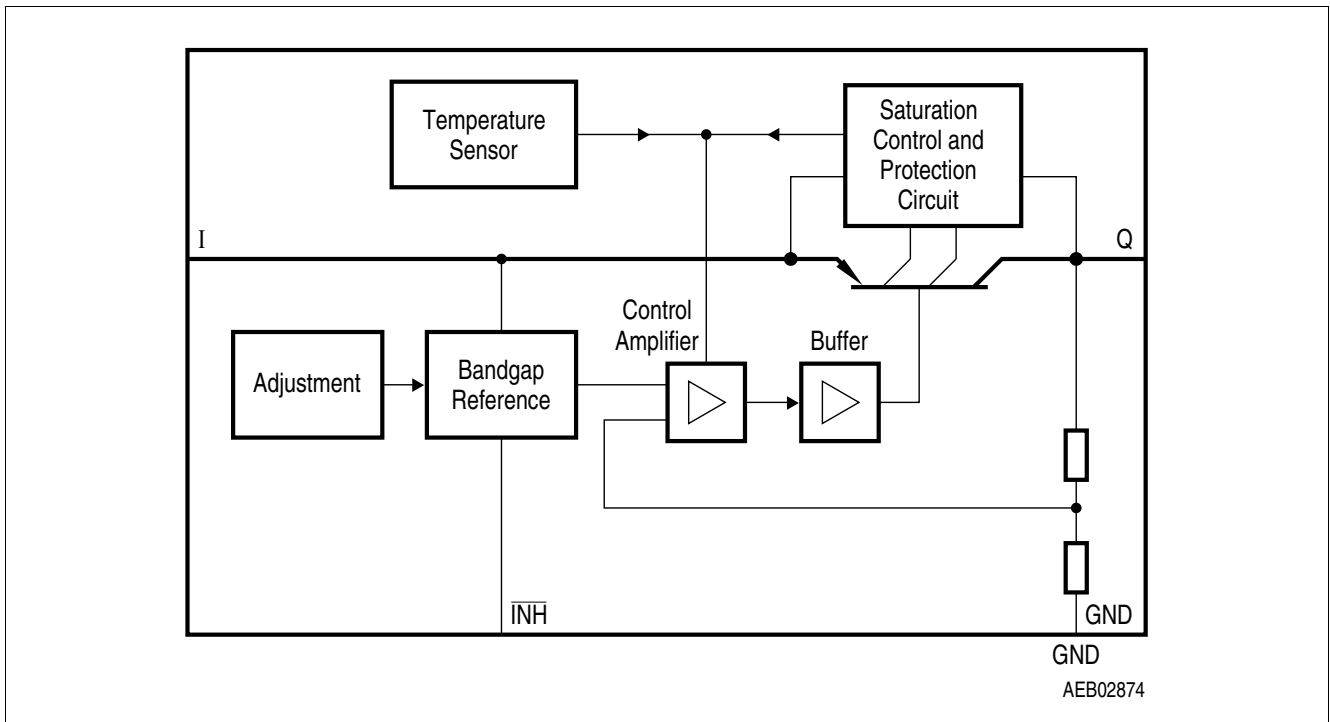
<b>Type</b>	<b>Package</b>	<b>Marking</b>
TLE4266-2G	PG-SOT223-4	4266-2
TLE4266-2GSV33	PG-SOT223-4	33 4266-2

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**Block diagram**

**1 Block diagram**



**Figure 1 Block diagram**

Pin configuration

## 2 Pin configuration

### 2.1 Pin assignment

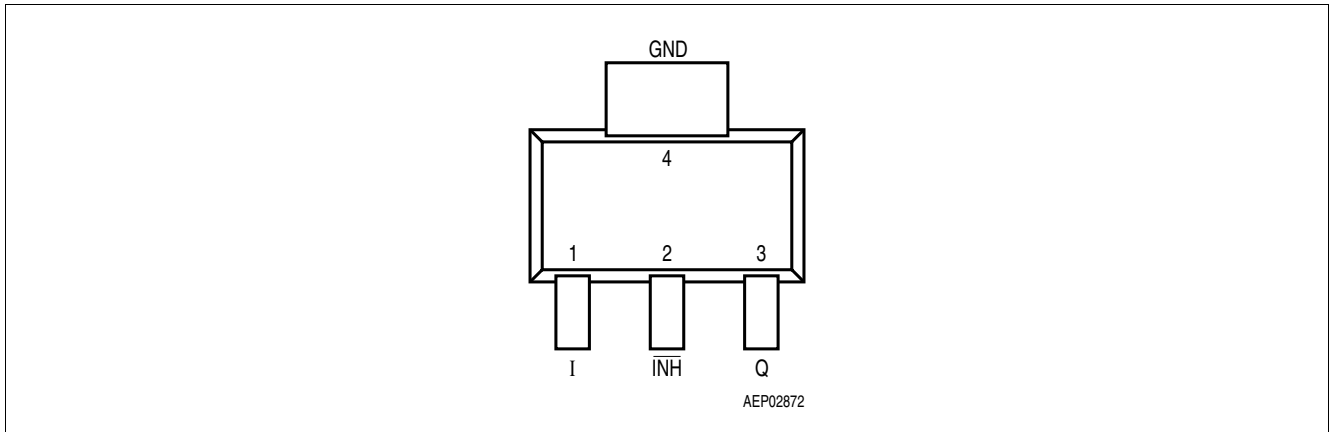


Figure 2 Pin configuration (top view)

### 2.2 Pin definitions and functions

Table 1 Pin definitions and functions TLE4266-2G, TLE4266-2GSV33

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>

**General product characteristics**

### 3 General product characteristics

#### 3.1 Absolute maximum ratings

**Table 2 Absolute maximum ratings**

$-40^{\circ}\text{C} \leq T_j \leq 150^{\circ}\text{C}$

Parameter	Symbol	Values			Unit	Note or Test Condition
		Min.	Typ.	Max.		
<b>Input I</b>						
Voltage	$V_I$	-42	-	45	V	-
Current	$I_I$	-	-	-	-	Internally limited
<b>Inhibit <math>\overline{\text{INH}}</math></b>						
Voltage	$V_{\overline{\text{INH}}}$	-42	-	45	V	-
<b>Output Q</b>						
Voltage	$V_Q$	-0.3	-	32	V	-
Current	$I_Q$	-	-	-	-	Internally limited
<b>GND</b>						
Current	$I_{\text{GND}}$	50	-	-	mA	-
<b>Temperature</b>						
Junction temperature	$T_j$	-	-	150	$^{\circ}\text{C}$	-
Storage temperature	$T_s$	-50	-	150	$^{\circ}\text{C}$	-
<b>Thermal resistance</b>						
Junction ambient	$R_{\text{thj-a}}$	-	-	81	K/W	PG-SOT223-4 <sup>1)</sup>
Junction case	$R_{\text{thj-pin4}}$	-	-	18	K/W	PG-SOT223-4
<b>Operating range</b>						
Input voltage	$V_I$	5.5	-	45	V	TLE4266-2G
		4.4	-	45	V	TLE4266-2GSV33
Junction temperature	$T_j$	-40	-	150	$^{\circ}\text{C}$	-

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

**Functional description**

## 4 Functional description

In the TLE4266-2G 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. 0.5 V (see [Chapter 4.3](#)) in case of the TLE4266-2G. The TLE4266-2GSV33 requires a minimum input voltage of 4.4 V.

The TLE4266-2G 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 TLE4266-2G 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 measuring circuit shown in **Figure 3** 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 TLE4266-2G includes the Inhibit function. For a voltage above 3.5 V at the  $\overline{\text{INH}}$  pin the regulator is switched on.

### 4.1 Electrical characteristics

**Table 3 Electrical characteristics**

$V_I = 13.5\text{ V}$ ;  $V_{\overline{\text{INH}}} = 5\text{ V}$ ;  $-40^\circ\text{C} \leq T_j \leq 125^\circ\text{C}$  (unless otherwise specified)

Parameter	Symbol	Values			Unit	Note or Test Condition
		Min.	Typ.	Max.		
Output voltage	$V_Q$	4.85	5.0	5.15	V	TLE4266-2G; 5 mA $\leq I_Q \leq$ 100 mA; 6 V $\leq V_I \leq$ 21 V
		4.9	5.0	5.1	V	TLE4266-2G; 5 mA $\leq I_Q \leq$ 50 mA; 9 V $\leq V_I \leq$ 16 V
Output voltage	$V_Q$	3.20	3.30	3,40	V	TLE4266-2GSV33; 5 mA $\leq I_Q \leq$ 100 mA; 6 V $\leq V_I \leq$ 21 V
Output-current limitation	$I_Q$	150	200	500	mA	–
Current consumption $I_q = I_I - I_Q$	$I_q$	–	0	1	$\mu\text{A}$	$V_{\overline{\text{INH}}} = 0\text{ V}$ ; $T_j \leq 100^\circ\text{C}$
Current consumption $I_q = I_I - I_Q$	$I_q$	–	40	60	$\mu\text{A}$	$I_Q = 100\ \mu\text{A}$ ; $T_j \leq 85^\circ\text{C}$
		–	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	$V_{Dr}$	–	0.25	0.5	V	TLE4266-2G; $I_Q = 100\text{ mA}^{1)}$
Drop voltage	$V_{Dr}$	–	1.00	1.10	V	TLE4266-2GSV33; $I_Q = 100\text{ mA}^{1)}$

**Functional description**

**Table 3 Electrical characteristics (cont'd)**

$V_I = 13.5\text{ V}$ ;  $V_{INH} = 5\text{ V}$ ;  $-40^\circ\text{C} \leq T_j \leq 125^\circ\text{C}$  (unless otherwise specified)

Parameter	Symbol	Values			Unit	Note or Test Condition
		Min.	Typ.	Max.		
Load regulation	$\Delta V_Q$	–	50	90	mV	TLE4266-2G; $I_Q = 1$ to $100\text{ mA}$ ; $V_I = 6\text{ V}$
Load regulation	$\Delta V_Q$	–	35	60	mV	TLE4266-2GSV33; $I_Q = 1$ to $100\text{ mA}$ ; $V_I = 6\text{ V}$
Line regulation	$\Delta V_Q$	–	5	30	mV	TLE4266-2G; $V_I = 6\text{ V}$ to $28\text{ V}$ ; $I_Q = 1\text{ mA}$
Line regulation	$\Delta V_Q$	–	4	20	mV	TLE4266-2GSV33; $V_I = 6\text{ V}$ to $28\text{ V}$ ; $I_Q = 1\text{ mA}$
Power supply ripple rejection	$PSRR$	–	68	–	dB	$f_r = 100\text{ Hz}$ ; $V_r = 0.5\text{ Vpp}$
Output Capacitor	$C_Q$	10	–	–	$\mu\text{F}$	$ESR \leq 4\ \Omega$ at $10\text{ kHz}$

**Inhibit**

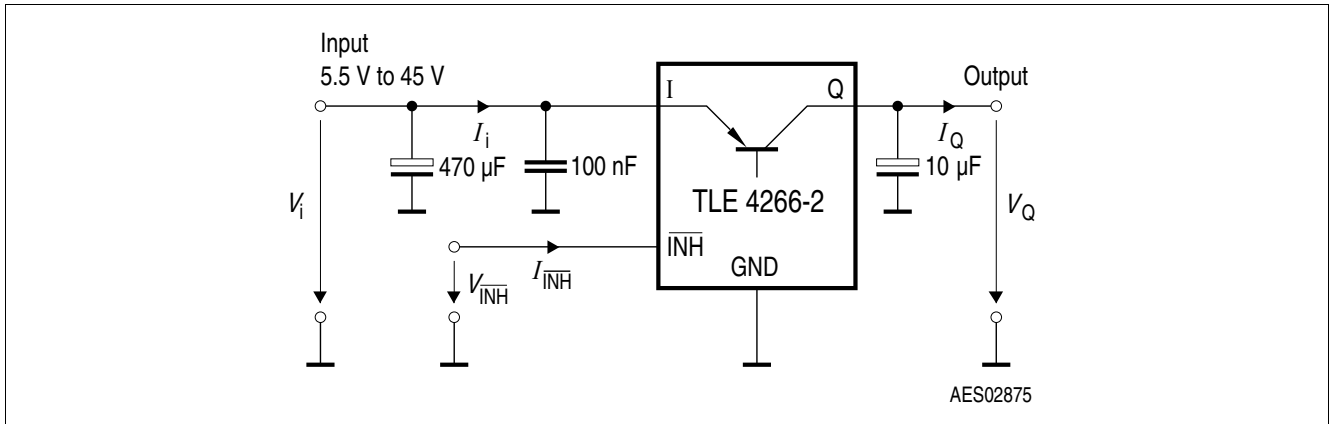
Inhibit on voltage	$V_{INH, on}$	3.5	–	–	V	–
Inhibit off voltage	$V_{INH, off}$	–	–	0.8	V	–
Inhibit current	$I_{INH}$	–	4	8	$\mu\text{A}$	$V_{INH} = 5\text{ V}$
Pull-down resistor	$R_{INH}$	–	1.0	–	$\text{M}\Omega$	see $I_{INH}$

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



**Functional description**

**4.2 Circuit description**

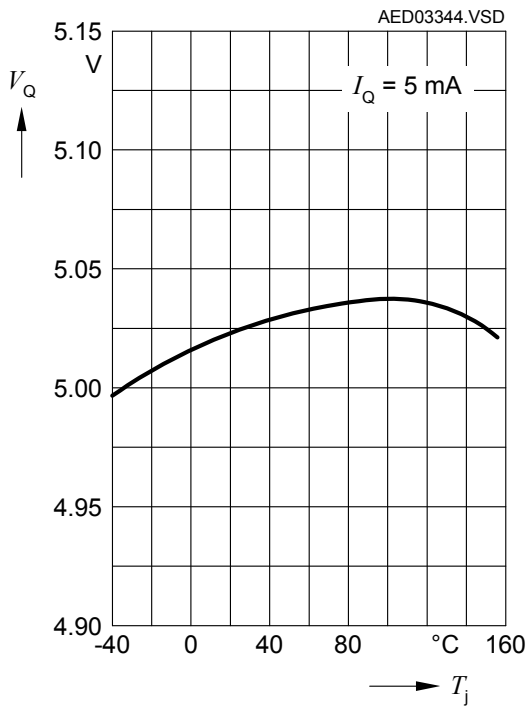


**Figure 3 Measuring circuit**

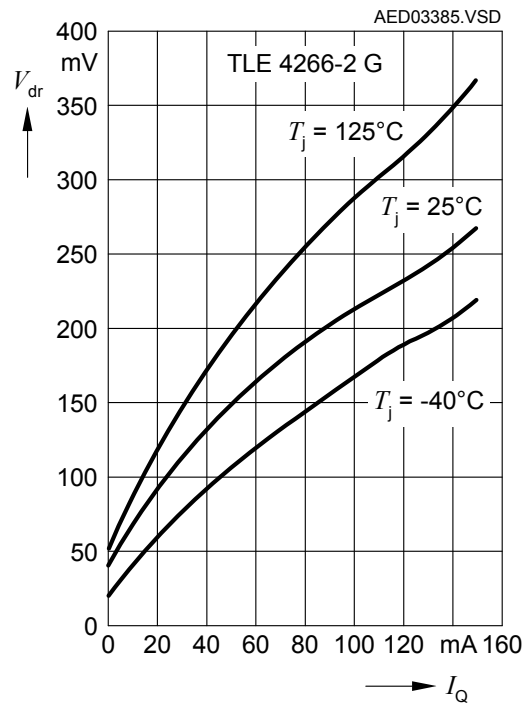
**Functional description**

**4.3 Typical performance characteristics**

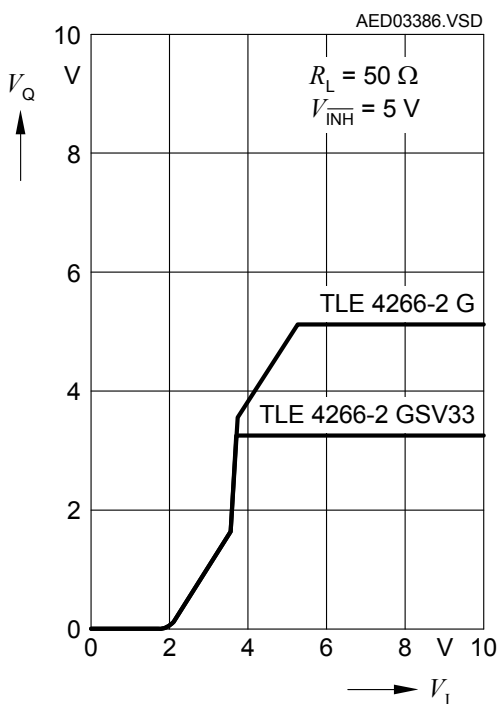
**Output voltage  $V_Q$  versus junction temperature  $T_j$**



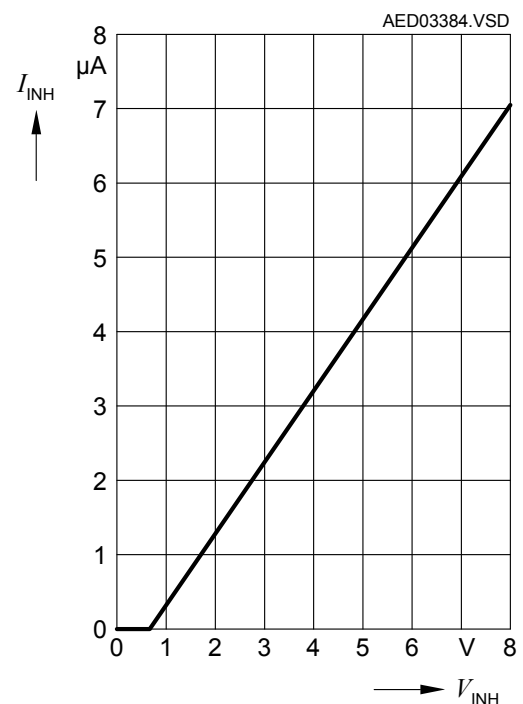
**Drop voltage  $V_{Dr}$  versus output current  $I_Q$  (TLE4266-2G)**



**Output voltage  $V_Q$  versus input voltage  $V_I$**

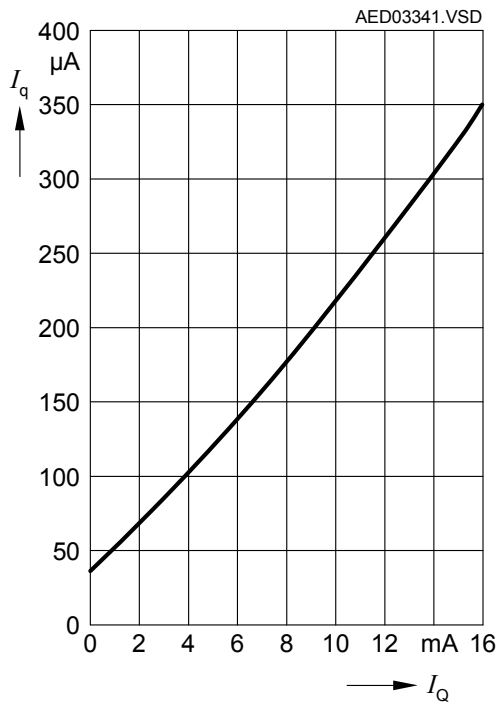


**Inhibit current  $I_{INH}$  versus inhibit voltage  $V_{INH}$**

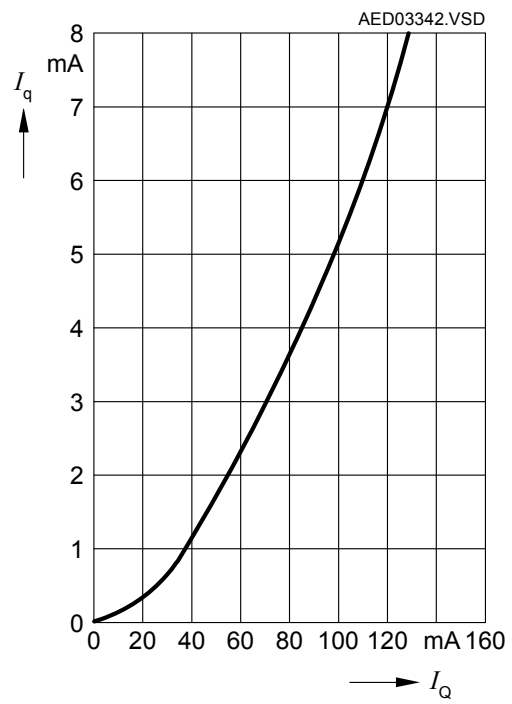


**Functional description**

**Current consumption  $I_q$  versus output current  $I_Q$**



**Current consumption  $I_q$  versus output current  $I_Q$**



## 5 Package information

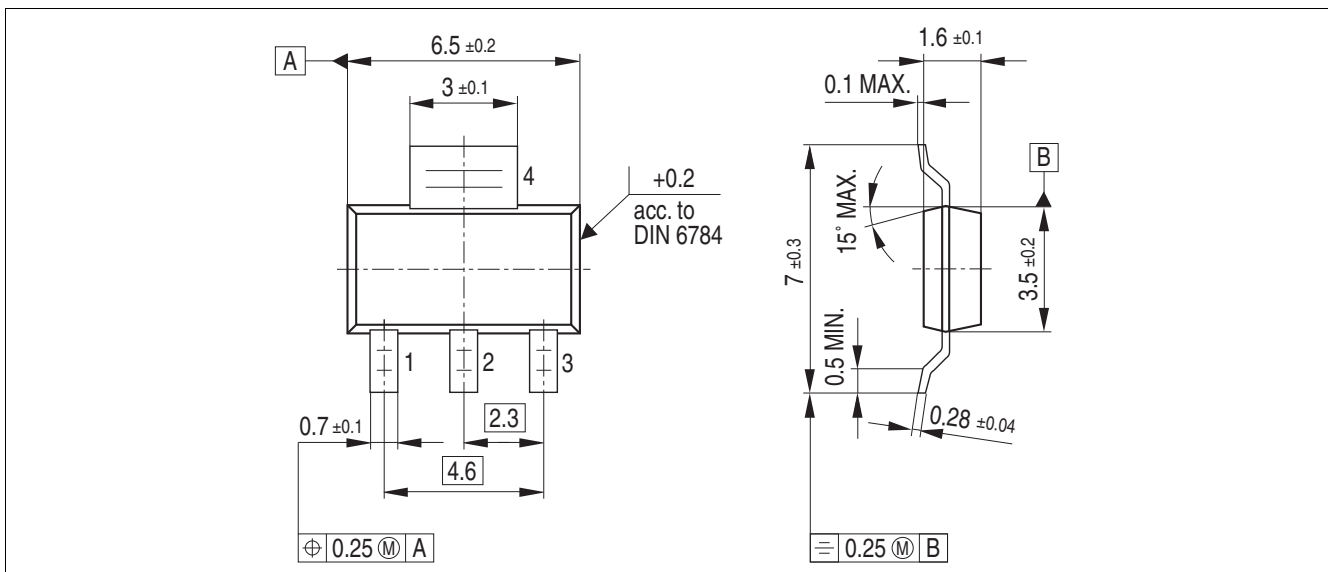


Figure 4 PG-SOT223-4 (plastic small outline transistor)<sup>1)</sup>

### 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).

### Further information on packages

<https://www.infineon.com/packages>

1) Dimensions in mm

**Revision history**

## **6 Revision history**

<b>Revision</b>	<b>Date</b>	<b>Changes</b>
1.51	2019-06-03	Editorial change, added marking
1.5	2019-02-15	Updated layout and structure. Editorial changes.
1.4	2008-03-10	Simplified package name to PG-SOT223-4. No modification of released product.
1.3	2007-03-20	Initial version of RoHS-compliant derivate of TLE4266-2G. Page 1: AEC certified statement added. Page 1: and Page 10: RoHS compliance statement and Green product feature added. Page 1: and Page 10: Package changed to RoHS compliant version. Legal Disclaimer updated.

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