

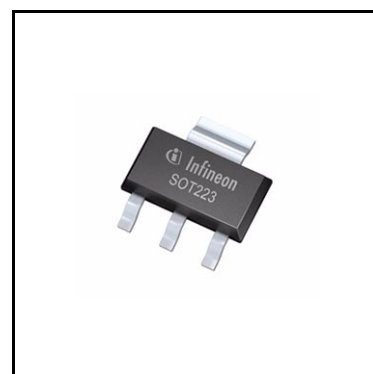
# OPTIREG™ Linear TLE4266G

## 5 V/10 V low drop voltage regulator



### Features

- Output voltage 5 V or 10 V
- Output voltage tolerance  $\leq \pm 2\%$
- 120 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 TLE4266G is a low-drop voltage regulator for 5 V or 10 V supply in a PG-SOT223-4 SMD package. The IC regulates an input voltage  $V_I$  in the range of  $5.5 \text{ V}/10.5 \text{ V} < V_I < 45 \text{ V}$  to  $V_{Q,nom} = 5 \text{ V}/10 \text{ V}$ . The maximum output current is more than 120 mA. The IC can be switched off via the inhibit input, which causes the current consumption to drop below 10  $\mu\text{A}$ . The IC is shortcircuit-proof and incorporates a temperature protection which turns off the IC at overtemperature.

### Choosing 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 line inductivity and input capacitance can be clamped. The output capacitor  $C_Q$  is necessary for the stability of the regulating circuit. Stability is guaranteed at values  $C_Q \geq 10 \mu\text{F}$  and an  $\text{ESR} \leq 10 \Omega$  within the whole operating temperature range.

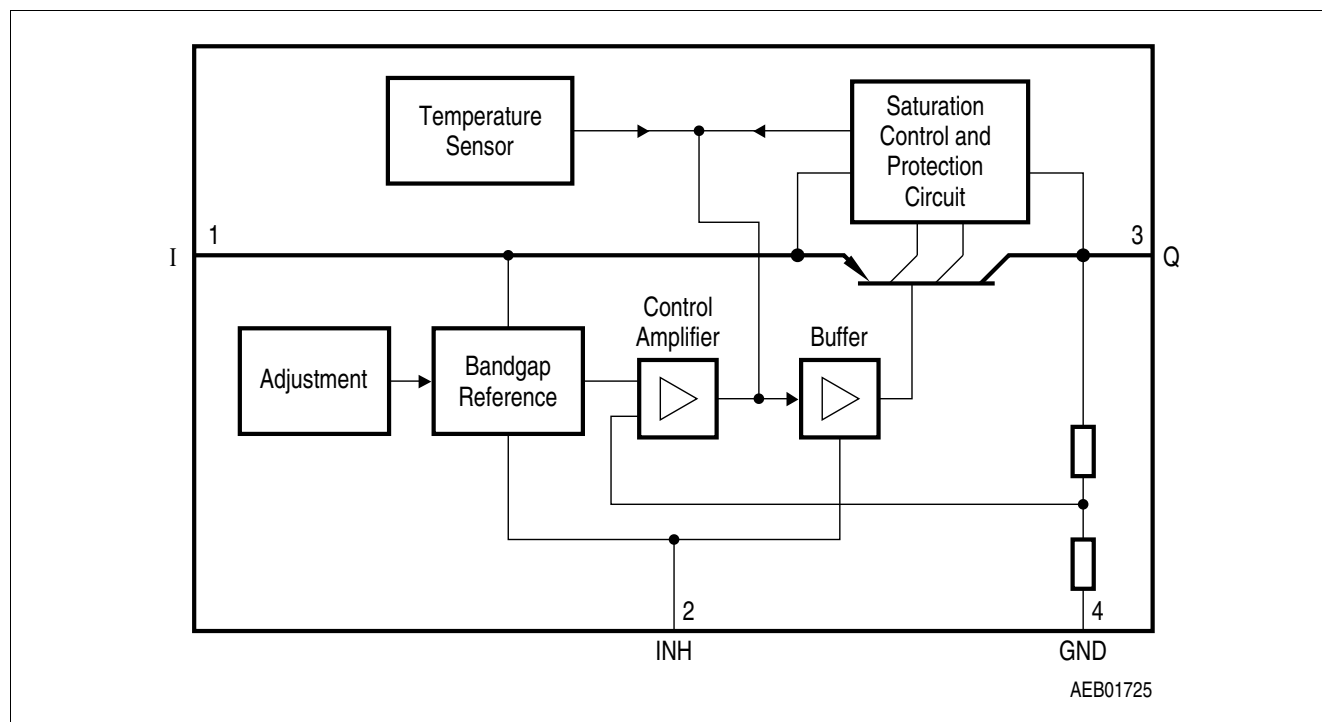
| Type         | Package     | Marking |
|--------------|-------------|---------|
| TLE4266G     | PG-SOT223-4 | 4266 G  |
| TLE4266GSV10 | PG-SOT223-4 | 66GV10  |

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**Block diagram**

**1 Block diagram**

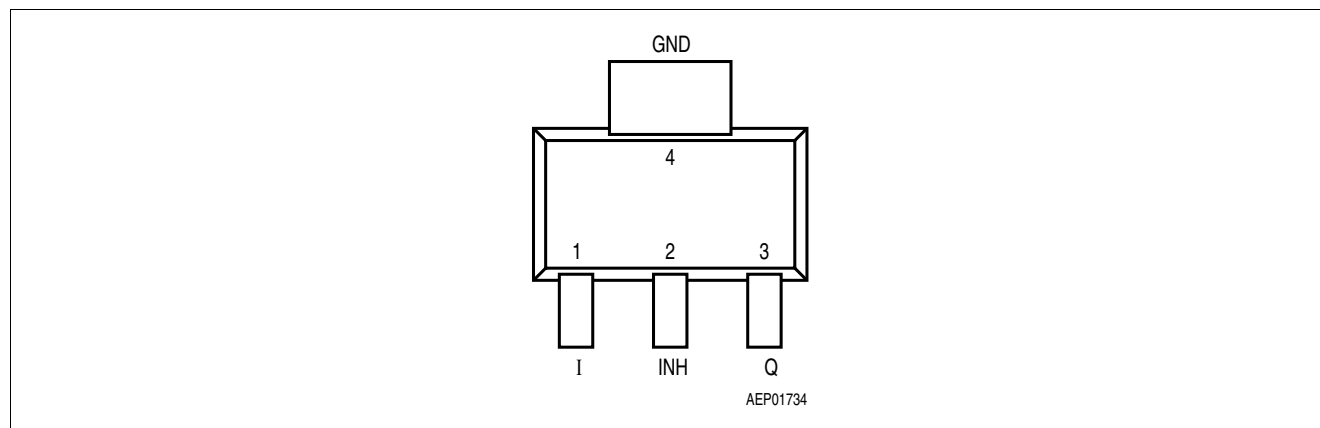


**Figure 1 Block diagram**

## 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

| Pin | Symbol                  | Function                                                                              |
|-----|-------------------------|---------------------------------------------------------------------------------------|
| 1   | I                       | <b>Input voltage</b><br>Block to ground directly at the IC with a ceramic capacitor.  |
| 2   | $\overline{\text{INH}}$ | <b>Inhibit input</b><br>Low-active input.                                             |
| 3   | Q                       | <b>Output voltage</b><br>Block to ground with a capacitor $C_Q \geq 10 \mu\text{F}$ . |
| 4   | GND                     | <b>Ground</b>                                                                         |

**General product characteristics**

### 3 General product characteristics

#### 3.1 Absolute maximum ratings

**Table 2 Absolute maximum ratings (TLE4266G, TLE4266GSV10)**

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

| Parameter                       | Symbol                      | Values |      |      | Unit | Note or Test Condition |
|---------------------------------|-----------------------------|--------|------|------|------|------------------------|
|                                 |                             | Min.   | Typ. | 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    | –                      |
| Output Q                        |                             |        |      |      |      |                        |
| Voltage                         | $V_Q$                       | -1     | –    | 32   | V    | –                      |
| Current                         | $I_Q$                       | –      | –    | –    | –    | Internally limited     |
| GND                             |                             |        |      |      |      |                        |
| Current                         | $I_{\text{GND}}$            | 50     | –    | –    | mA   | –                      |
| Temperature                     |                             |        |      |      |      |                        |
| Junction temperature            | $T_J$                       | –      | –    | 150  | °C   | –                      |
| Storage temperature             | $T_S$                       | -50    | –    | 150  | °C   | –                      |
| Operating range (TLE4266G)      |                             |        |      |      |      |                        |
| Input voltage                   | $V_I$                       | 5.5    | –    | 45   | V    | –                      |
| Junction temperature            | $T_j$                       | -40    | –    | 150  | °C   | –                      |
| Operating range (TLE4266GSV10)  |                             |        |      |      |      |                        |
| Input voltage                   | $V_I$                       | 10.5   | –    | 45   | V    | –                      |
| Junction temperature            | $T_j$                       | -40    | –    | 150  | °C   | –                      |
| Thermal resistance              |                             |        |      |      |      |                        |
| Junction ambient                | $R_{\text{thj-a}}$          | –      | –    | 165  | K/W  | 1)                     |
| Junction case                   | $R_{\text{thj-pin}}$        | –      | –    | 17   | K/W  | Measured to pin 4      |

1) Package mounted on PCB  $80 \times 80 \times 1.5 \text{ mm}^3$ ; 35  $\mu\text{m}$  Cu; 5  $\mu\text{m}$  Sn; Footprint only; zero airflow.

## Functional description

### 4 Functional description

The device includes a precise reference voltage, which is very accurate due to resistor adjustment. A control amplifier compares the divided output voltage to this reference voltage and drives the base of the PNP series transistor through a buffer.

Saturation control as a function of the load current prevents any oversaturation of the power element. The IC also incorporates a number of protection circuitry for:

- Overload
- Overtemperature
- Reverse polarity

#### 4.1 Electrical characteristics

**Table 3 Electrical characteristics (TLE4266G)**

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

| Parameter                                | Symbol                   | Values |      |      | Unit          | Note or Test Condition                                                                    |
|------------------------------------------|--------------------------|--------|------|------|---------------|-------------------------------------------------------------------------------------------|
|                                          |                          | Min.   | Typ. | Max. |               |                                                                                           |
| Output voltage                           | $V_Q$                    | 4.9    | 5    | 5.1  | V             | $5 \text{ mA} \leq I_Q \leq 100 \text{ mA}$ ;<br>$6 \text{ V} \leq V_i \leq 28 \text{ V}$ |
| Output-current limitation                | $I_Q$                    | 120    | 150  | –    | mA            | –                                                                                         |
| Current consumption<br>$I_q = I_i - I_Q$ | $I_q$                    | –      | –    | 10   | $\mu\text{A}$ | $V_{\text{INH}} = 0 \text{ V}$ ;<br>$T_j \leq 100^\circ\text{C}$                          |
| Current consumption<br>$I_q = I_i - I_Q$ | $I_q$                    | –      | –    | 400  | $\mu\text{A}$ | $I_Q = 1 \text{ mA}$<br>Inhibit ON                                                        |
| Current consumption<br>$I_q = I_i - I_Q$ | $I_q$                    | –      | 10   | 15   | mA            | $I_Q = 100 \text{ mA}$<br>Inhibit ON                                                      |
| Drop voltage                             | $V_{\text{Dr}}$          | –      | 0.25 | 0.5  | V             | $I_Q = 100 \text{ mA}^{1)}$                                                               |
| Load regulation                          | $\Delta V_{Q,\text{lo}}$ | –      | –    | 40   | mV            | $I_Q = 5 \text{ to } 100 \text{ mA}$ ;<br>$V_i = 6 \text{ V}$                             |
| Line regulation                          | $\Delta V_{Q,\text{li}}$ | –      | 15   | 30   | mV            | $V_i = 6 \text{ V to } 28 \text{ V}$ ;<br>$I_Q = 5 \text{ mA}$                            |
| Power supply ripple rejection            | $PSRR$                   | –      | 54   | –    | dB            | $f_r = 100 \text{ Hz}$ ;<br>$V_r = 0.5 \text{ Vpp}$                                       |

#### Inhibit

|                     |                       |     |    |     |               |                                |
|---------------------|-----------------------|-----|----|-----|---------------|--------------------------------|
| Inhibit on voltage  | $V_{\text{INH, on}}$  | 3.5 | –  | –   | V             | –                              |
| Inhibit off voltage | $V_{\text{INH, off}}$ | –   | –  | 0.8 | V             | –                              |
| Inhibit current     | $I_{\text{INH}}$      | 5   | 15 | 25  | $\mu\text{A}$ | $V_{\text{INH}} = 5 \text{ V}$ |

1) Drop voltage  $V_{\text{Dr}} = V_i - V_Q$  (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**

**Table 4 Electrical characteristics (TLE4266GSV10)**

$V_I = 13.5 \text{ V}$ ;  $-40^\circ\text{C} \leq T_j \leq 125^\circ\text{C}$

| Parameter                                | Symbol                    | Values |      |      | Unit          | Note or Test Condition                                                                     |
|------------------------------------------|---------------------------|--------|------|------|---------------|--------------------------------------------------------------------------------------------|
|                                          |                           | Min.   | Typ. | Max. |               |                                                                                            |
| Output voltage                           | $V_Q$                     | 9.8    | 10   | 10.2 | V             | $5 \text{ mA} \leq I_Q \leq 100 \text{ mA}$ ;<br>$11 \text{ V} \leq V_I \leq 21 \text{ V}$ |
| Output voltage                           | $V_Q$                     | 9.8    | 10   | 10.2 | V             | $1 \text{ mA} \leq I_Q \leq 50 \text{ mA}$ ;<br>$11 \text{ V} \leq V_I \leq 28 \text{ V}$  |
| Output-current limitation                | $I_Q$                     | 120    | 150  | 200  | mA            | –                                                                                          |
| Current consumption<br>$I_q = I_I - I_Q$ | $I_{q, \text{off}}$       | –      | –    | 10   | $\mu\text{A}$ | $V_{\text{INH}} = 0 \text{ V}$ ;<br>$T_j \leq 100^\circ\text{C}$                           |
| Current consumption<br>$I_q = I_I - I_Q$ | $I_q$                     | –      | 350  | 500  | $\mu\text{A}$ | $I_Q < 1 \text{ mA}$<br>Inhibit ON                                                         |
| Current consumption<br>$I_q = I_I - I_Q$ | $I_q$                     | –      | 7    | 15   | mA            | $I_Q < 100 \text{ mA}$<br>Inhibit ON                                                       |
| Drop voltage                             | $V_{\text{Dr}}$           | –      | 0.28 | 0.5  | V             | $I_Q = 100 \text{ mA}^{1)}$                                                                |
| Load regulation                          | $\Delta V_{Q, \text{Lo}}$ | -80    | –    | 80   | mV            | $I_Q = 5 \text{ to } 100 \text{ mA}$ ;<br>$V_I = 11 \text{ V}$                             |
| Line regulation                          | $\Delta V_{Q, \text{Li}}$ | -30    | 5    | 30   | mV            | $V_I = 11 \text{ V to } 28 \text{ V}$ ;<br>$I_Q = 5 \text{ mA}$                            |
| Power supply ripple rejection            | $PSRR$                    | –      | 54   | –    | dB            | $f_r = 100 \text{ Hz}$ ;<br>$V_r = 0.5 \text{ Vpp}$                                        |

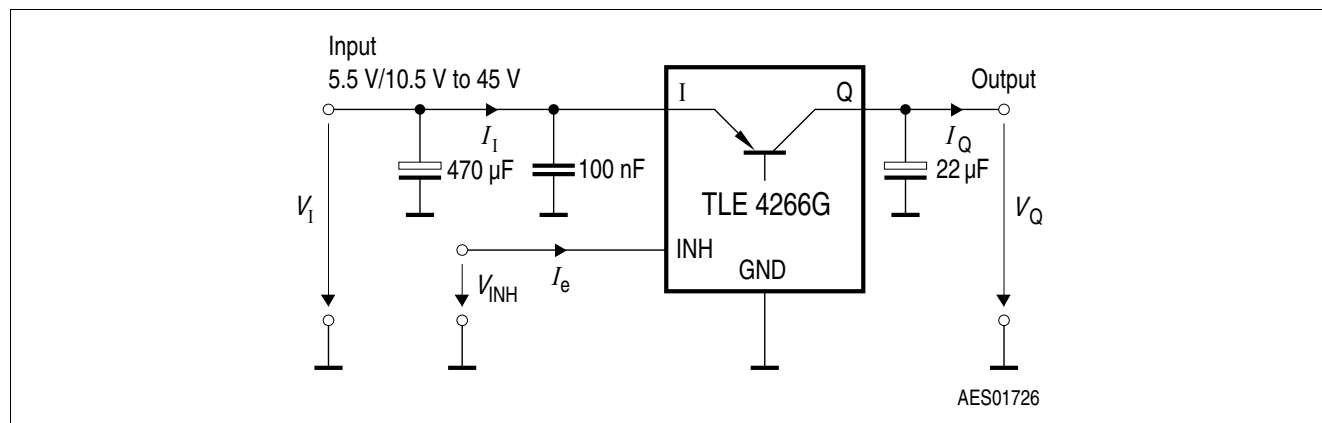
**Inhibit**

|                     |                       |     |    |     |               |                                |
|---------------------|-----------------------|-----|----|-----|---------------|--------------------------------|
| Inhibit on voltage  | $V_{\text{INH, on}}$  | 3.5 | –  | –   | V             | –                              |
| Inhibit off voltage | $V_{\text{INH, off}}$ | –   | –  | 0.8 | V             | –                              |
| Inhibit current     | $I_{\text{INH}}$      | 5   | 12 | 25  | $\mu\text{A}$ | $V_{\text{INH}} = 5 \text{ V}$ |

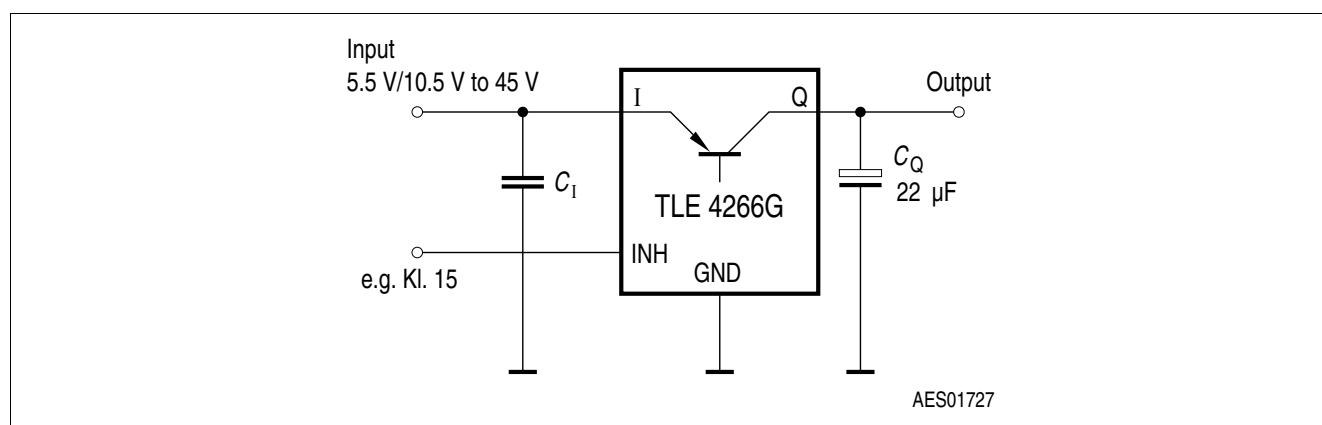
1) Drop voltage =  $V_I - V_Q$  measured when the output voltage  $V_Q$  has dropped 100 mV from the nominal value.

## Functional description

### 4.2 Circuit description



**Figure 3** Measuring circuit (TLE4266G, TLE4266GSV10)

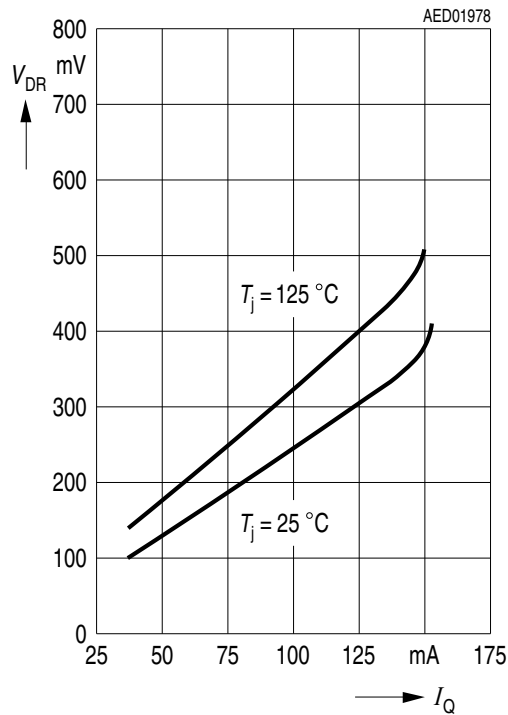


**Figure 4** Application circuit (TLE4266G, TLE4266GSV10)

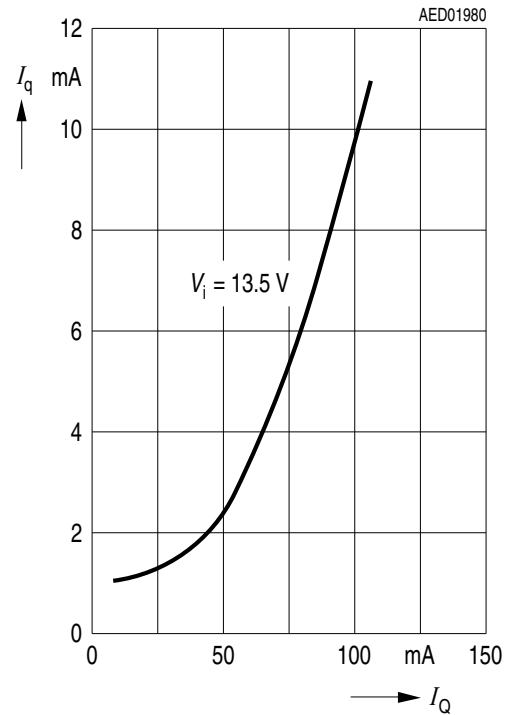
## Functional description

### 4.3 Typical performance characteristics

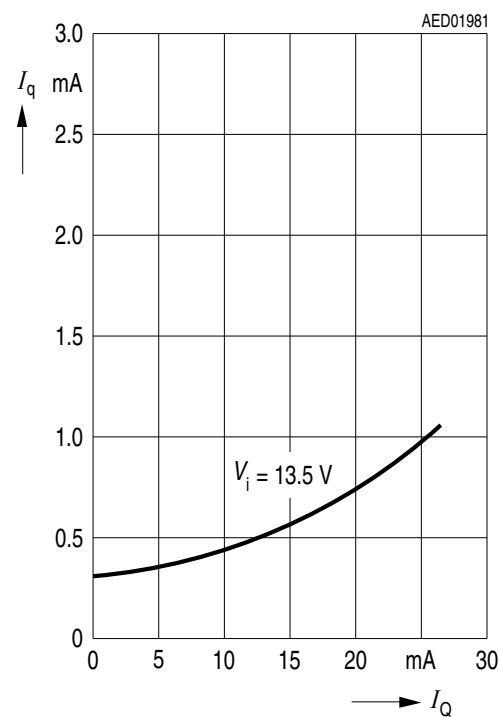
**Drop voltage  $V_{Dr}$  versus  
output current  $I_Q$  (5 V, 10 V)**



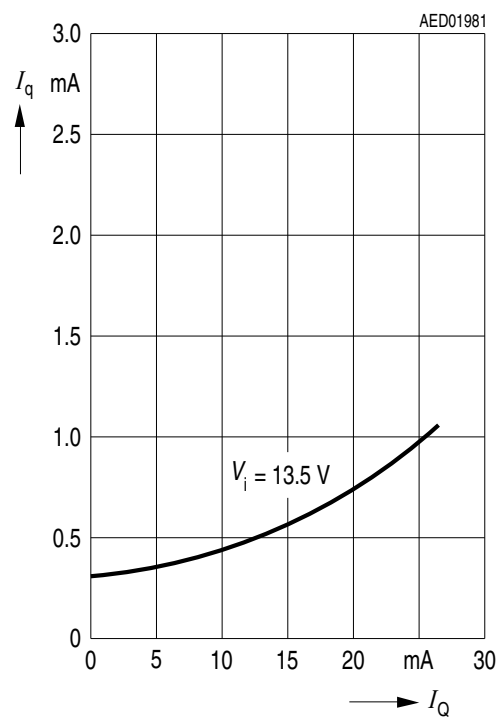
**Current consumption  $I_q$  versus  
output current  $I_Q$  (5 V)**



**Current consumption  $I_q$  versus  
output current  $I_Q$  (5 V version)**

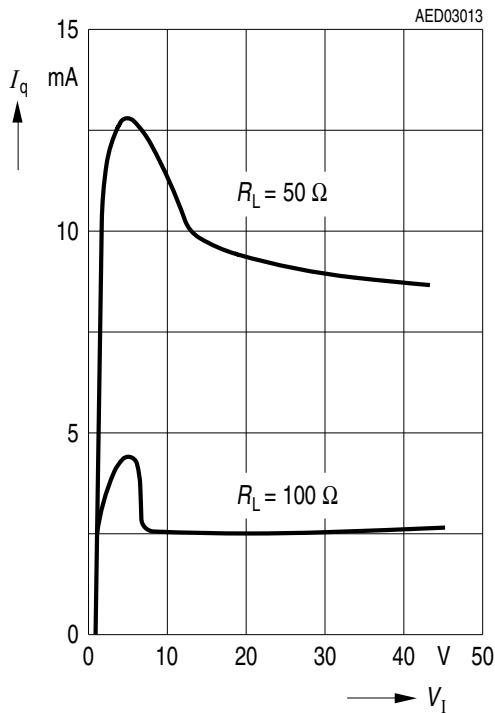


**Current consumption  $I_q$  versus  
output current  $I_Q$  (10 V version)**

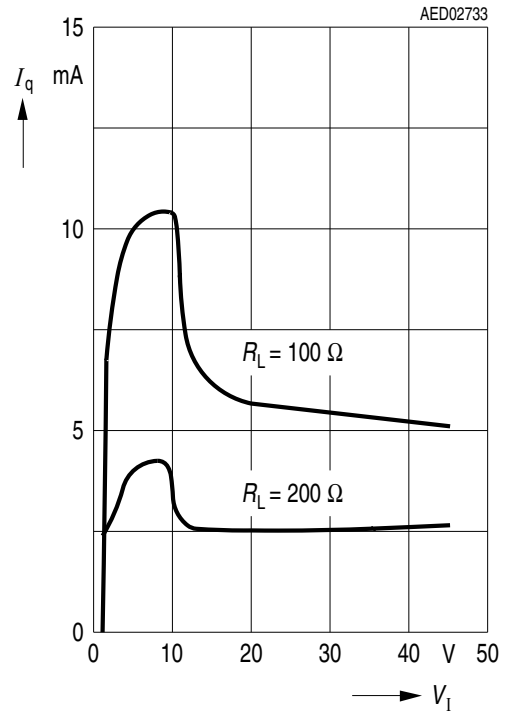


**Functional description**

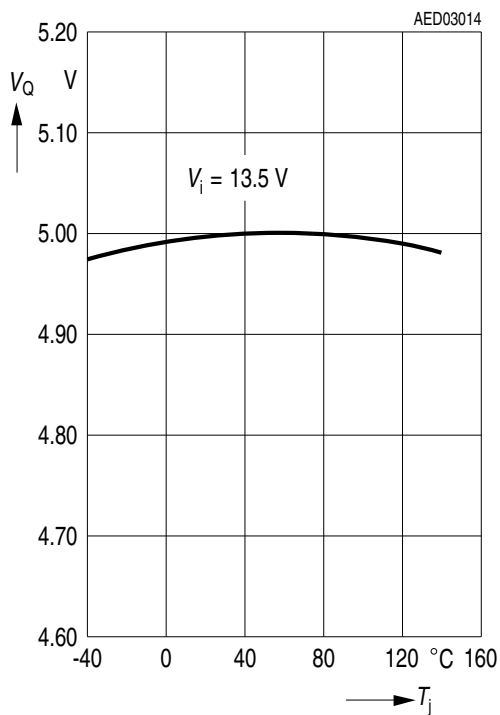
**Current consumption  $I_q$  versus input voltage  $V_i$  (5 V version)**



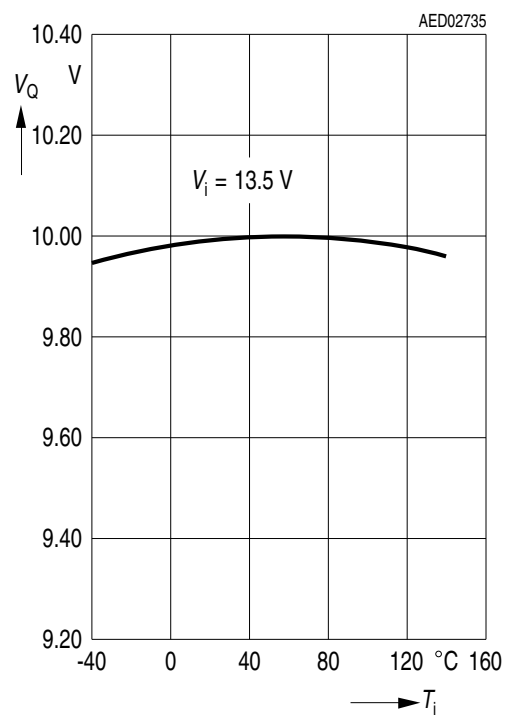
**Current consumption  $I_q$  versus input voltage  $V_i$  (10 V version)**



**Output voltage  $V_Q$  versus temperature  $T_j$  (5 V version)**

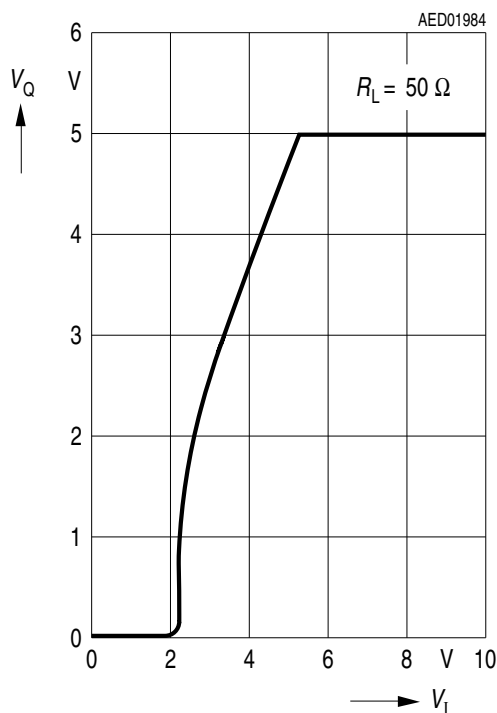


**Output voltage  $V_Q$  versus temperature  $T_j$  (10 V version)**

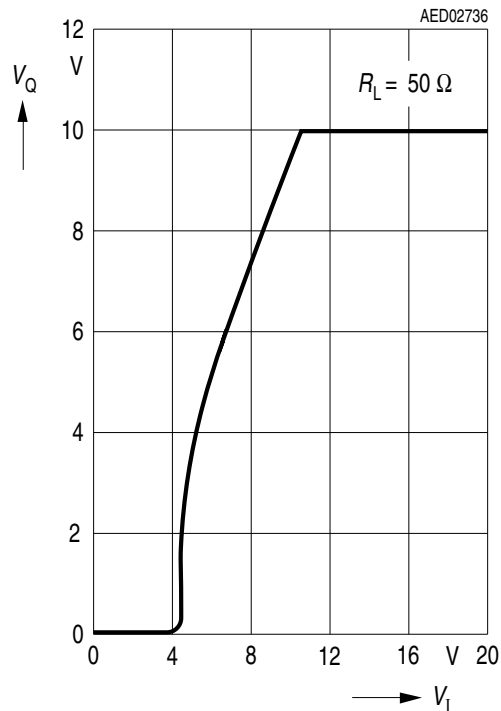


## Functional description

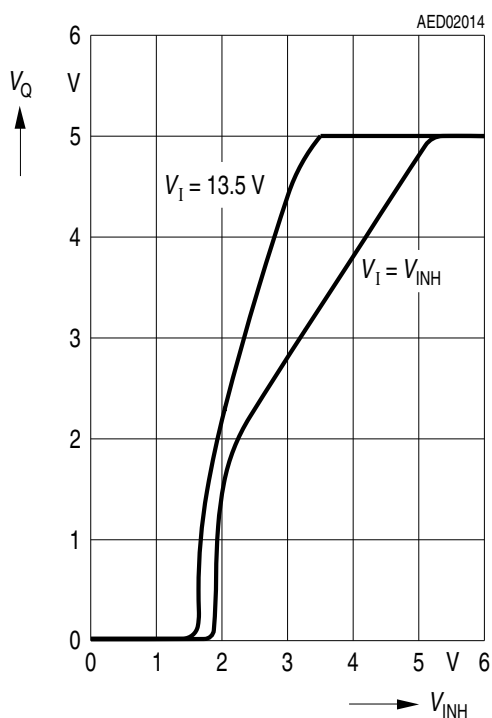
**Output voltage  $V_Q$  versus  
input voltage  $V_I$  (5 V version)**



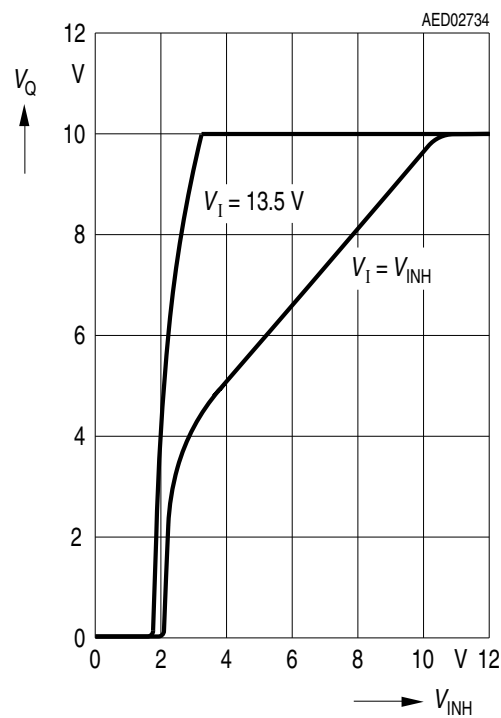
**Output voltage  $V_Q$  versus  
input voltage  $V_I$  (10 V version)**



**Output voltage  $V_Q$  versus  
inhibit voltage  $V_{INH}$  (5 V version)**

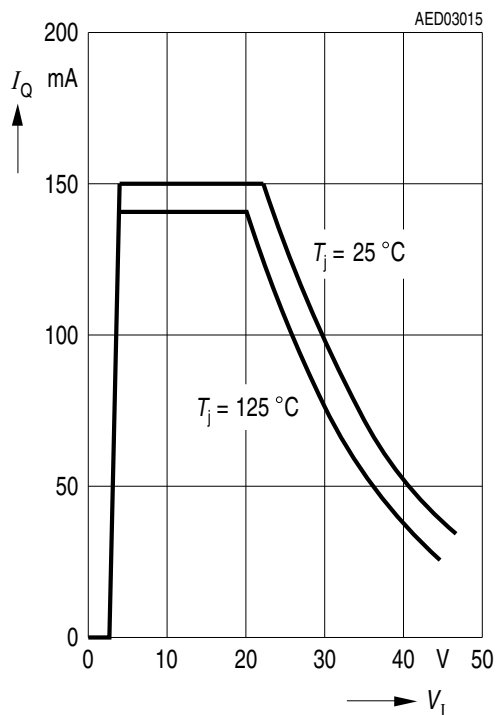


**Output voltage  $V_Q$  versus  
inhibit voltage  $V_{INH}$  (10 V version)**

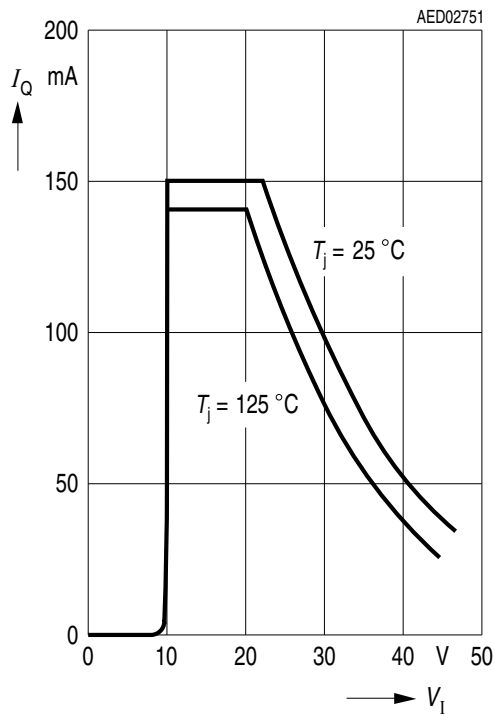


## Functional description

**Output current  $I_Q$  versus  
input voltage  $V_I$  (5 V version)**

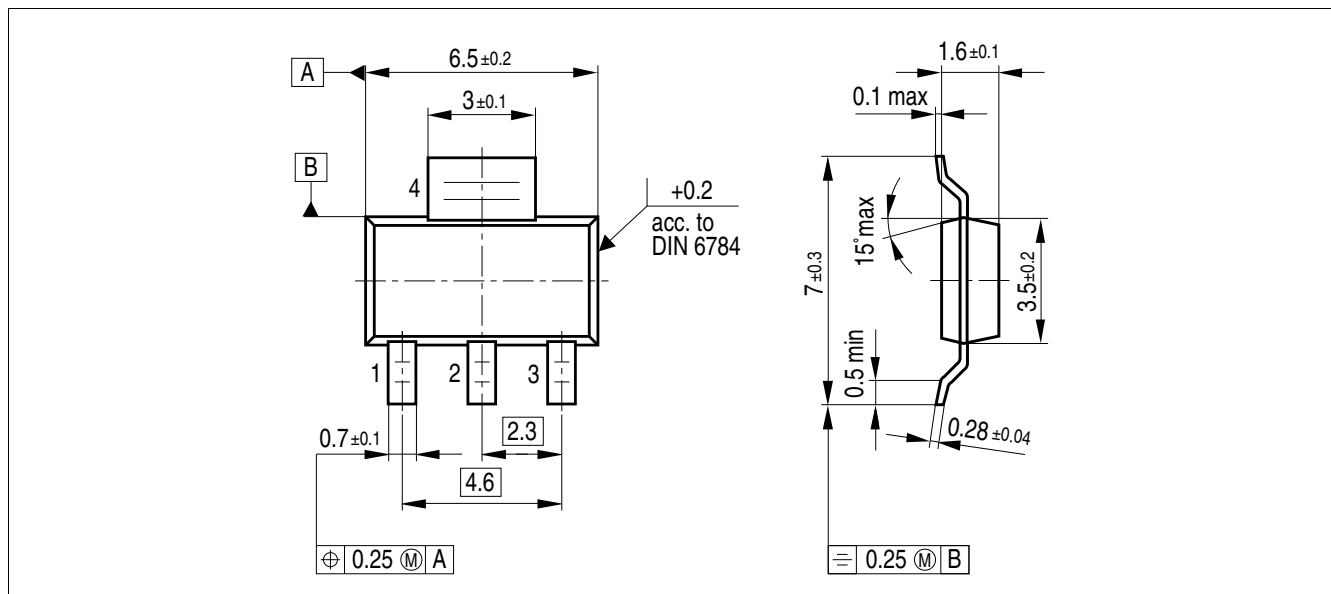


**Output current  $I_Q$  versus  
input voltage  $V_I$  (10 V version)**



## Package information

### 5 Package information



**Figure 5** 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>

<sup>1)</sup> Dimensions in mm

**Revision history**

## **6 Revision history**

| <b>Revision</b> | <b>Date</b> | <b>Changes</b>                                                                                                                                                                                                                    |
|-----------------|-------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 2.61            | 2019-06-03  | Editorial change, added marking                                                                                                                                                                                                   |
| 2.6             | 2019-02-15  | Updated layout and structure.<br>Editorial changes.                                                                                                                                                                               |
| 2.5             | 2008-03-10  | Simplified package name to PG-SOT223-4.<br>No modification of released product.                                                                                                                                                   |
| 2.4             | 2007-03-20  | Initial version of RoHS-compliant derivate of TLE4266.<br>AEC certified statement added.<br>RoHS compliance statement and Green product feature added.<br>Package changed to RoHS compliant version.<br>Legal Disclaimer updated. |

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**Edition 2019-06-03**

**Published by**

**Infineon Technologies AG**

**81726 Munich, Germany**

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