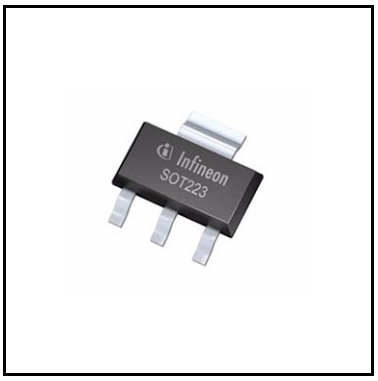
OPTIREG™ linear TLE4266-2

Low drop voltage regulator

AEC Qualified RoHS



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 function
- 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 TLE4266-2 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 functionally compatible to the TLE4266, but with a reduced quiescent current a lot less 1 µA in OFF mode and 40 µA in ON mode. The TLE4266-2 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 PG-SOT223-4 package. It is pin compatible to the TLE4266G. It is designed to supply microprocessor systems under the severe conditions of automotive applications and therefore it is equipped with additional protection against overloads, short-circuits and overtemperature. Of course, the TLE4266-2 can be used in other applications, where a stabilized voltage and the inhibit feature is required.

An input voltage V_I up to 45 V is regulated to V_Q = 5 V (TLE4266-2G) or V_Q = 3.3 V (TLE4266-2GSV33) 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	Package	Marking
TLE4266-2G	PG-SOT223-4	4266-2
TLE4266-2GSV33	PG-SOT223-4	33 4266-2

Table of contents

1 Block diagram

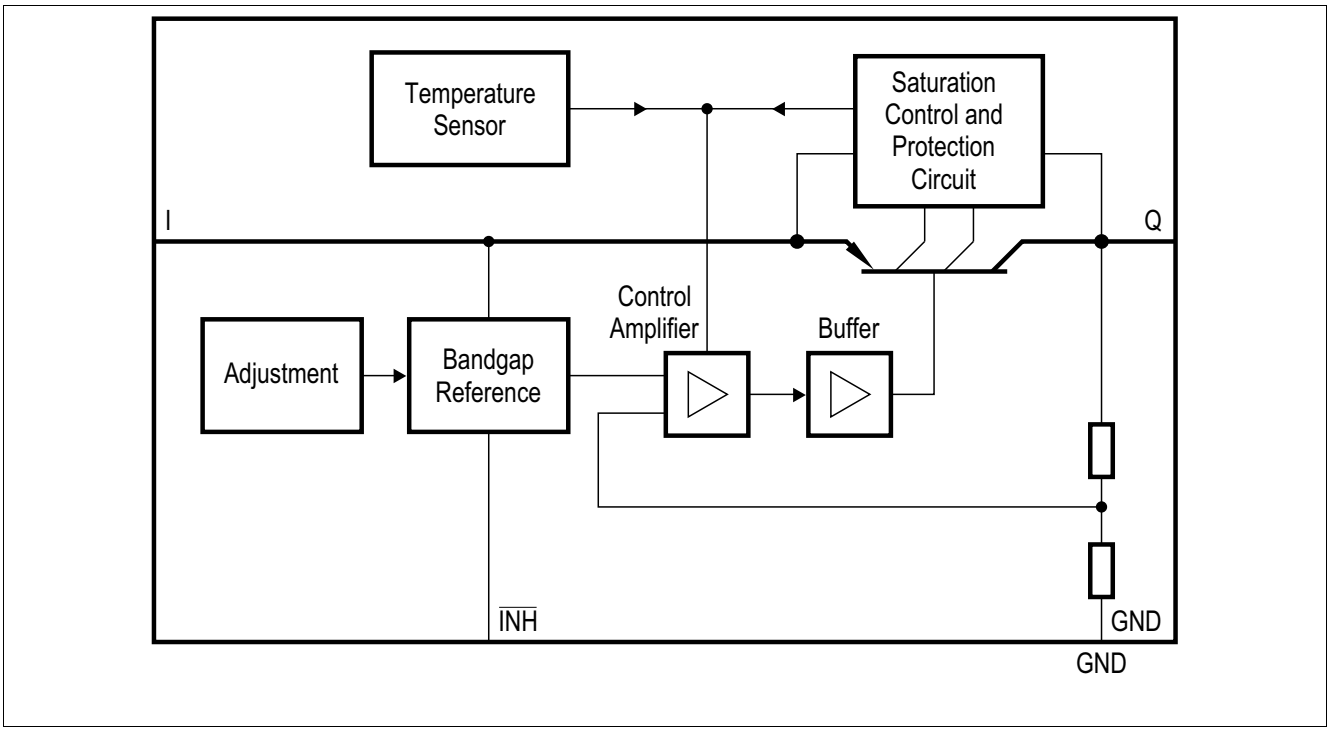


Figure 1 Block diagram

2 Pin configuration

2.1 Pin assignment

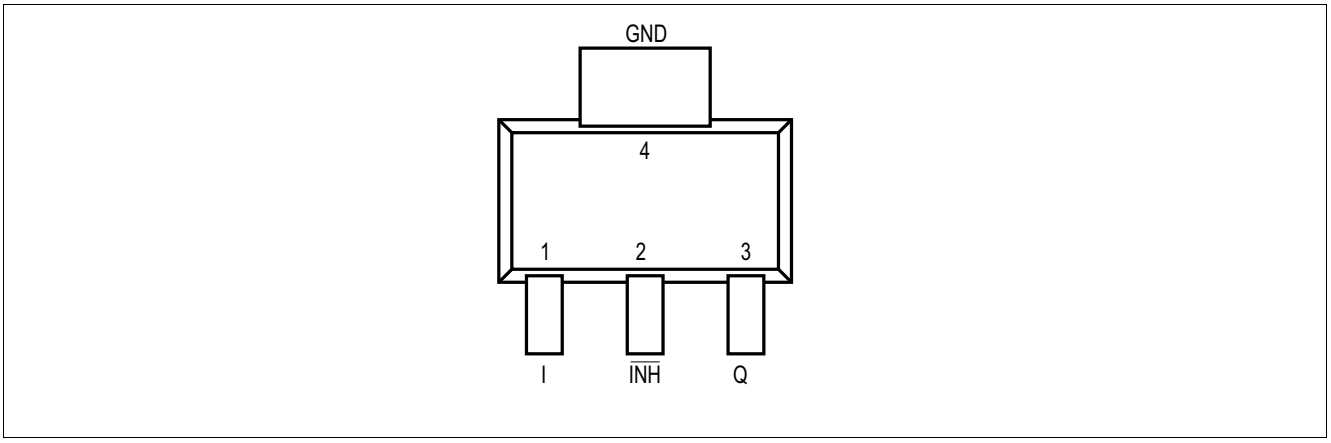


Figure 2 Pin configuration (top view)

2.2 Pin definitions and functions

Table 1 Pin definitions and functions

Pin	Symbol	Function
1	I	**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**

3 General product characteristics

3.1 Absolute maximum ratings

Table 2 Absolute maximum ratings

-40°C ≤ T_j ≤ 150°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 $\overline{INH}$						
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	1)
Junction case	$R_{thj\text{-}pin4}$	–	–	18	K/W	
Operating range						
Input voltage	V_I	5.5	–	45	V	TLE4266-2G
		4.4	–	45	V	TLE4266-2GSV33
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.

4 Functional description

In the TLE4266-2 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 **Chapter 4.3**) in case of the TLE4266-2G. The TLE4266-2GSV33 requires a minimum input voltage of 4.4 V.

The TLE4266-2 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 TLE4266-2 output requires an output capacitor C_Q of at least 10 µF with a maximum permissible ESR of 4 Ω. Tantalum as well as multilayer 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 TLE4266-2 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 V; $V_{\overline{INH}}$ = 5 V; -40°C ≤ T_j ≤ 125°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 ≤ I_Q ≤ 100 mA; 6 V ≤ V_I ≤ 21 V
		4.9	5.0	5.1	V	TLE4266-2G; 5 mA ≤ I_Q ≤ 50 mA; 9 V ≤ V_I ≤ 16 V
Output voltage	V_Q	3.20	3.30	3,40	V	TLE4266-2GSV33; 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_{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	TLE4266-2G; I_Q = 100 mA[1)]
Drop voltage	V_{Dr}	–	1.00	1.10	V	TLE4266-2GSV33; I_Q = 100 mA[1)]

Table 3 Electrical characteristics (cont'd)

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

Parameter	Symbol	Values			Unit	Note or Test Condition
		Min.	Typ.	Max.		
Load regulation	ΔV_Q	–	50	90	mV	TLE4266-2G; I_Q = 1 to 100 mA; V_I = 6 V
Load regulation	ΔV_Q	–	35	60	mV	TLE4266-2GSV33; I_Q = 1 to 100 mA; V_I = 6 V
Line regulation	ΔV_Q	–	5	30	mV	TLE4266-2G; V_I = 6 V to 28 V; I_Q = 1 mA
Line regulation	ΔV_Q	–	4	20	mV	TLE4266-2GSV33; V_I = 6 V to 28 V; I_Q = 1 mA
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 $V_{Dr} = V_I - V_Q$ (measured when the output voltage V_Q has dropped 100 mV from the nominal value obtained at V_I = 13.5 V).

4.2 Circuit description

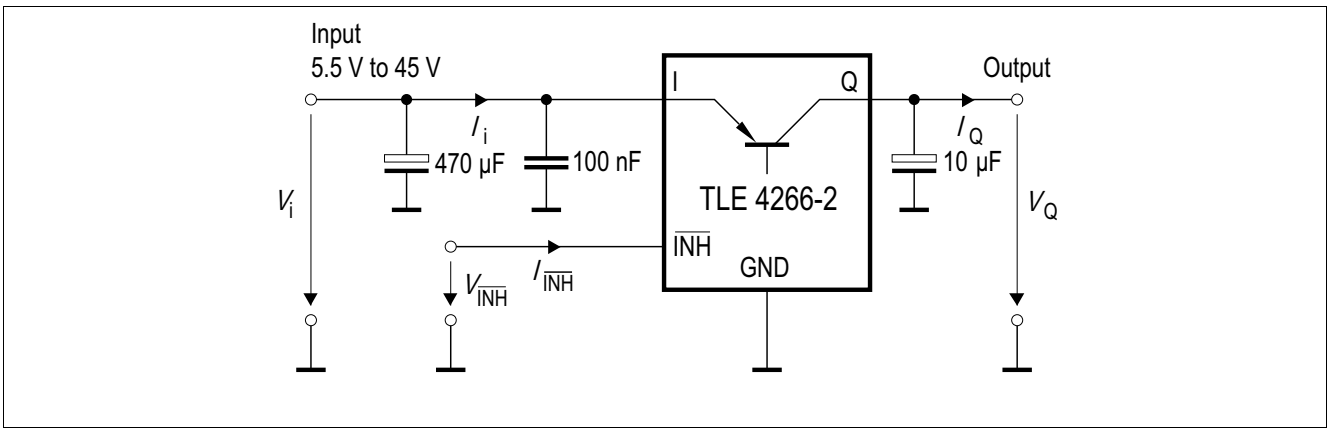
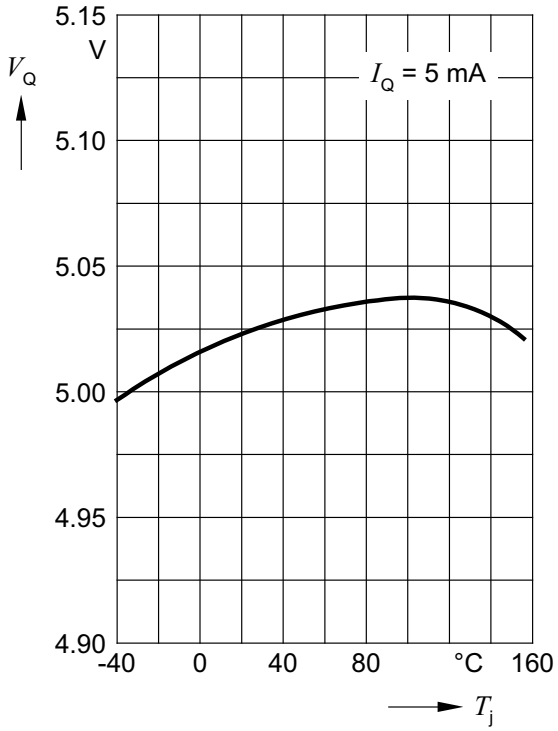


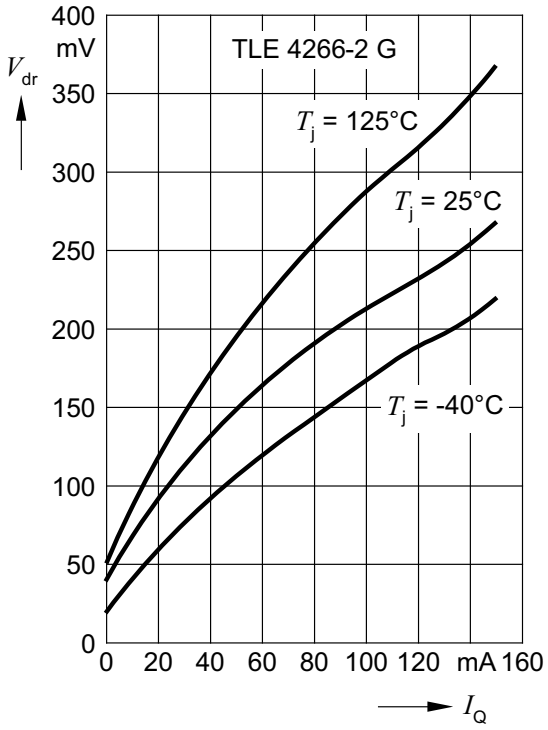
Figure 3 Measuring circuit

4.3 Typical performance characteristics

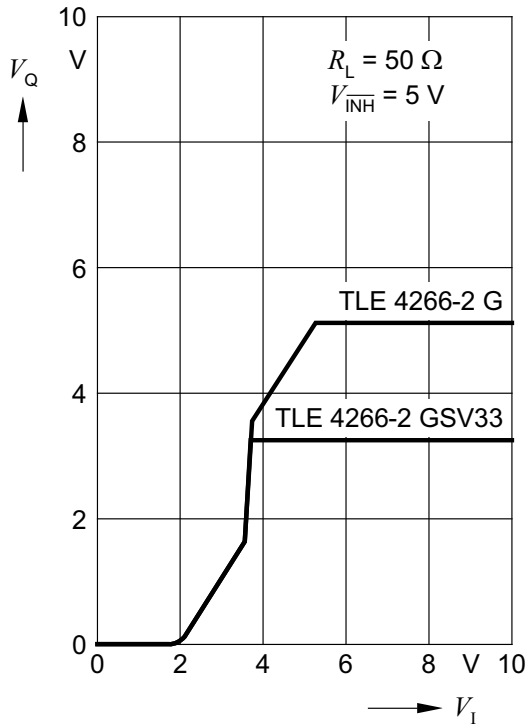
Output voltage V_Q versus junction temperature T_j



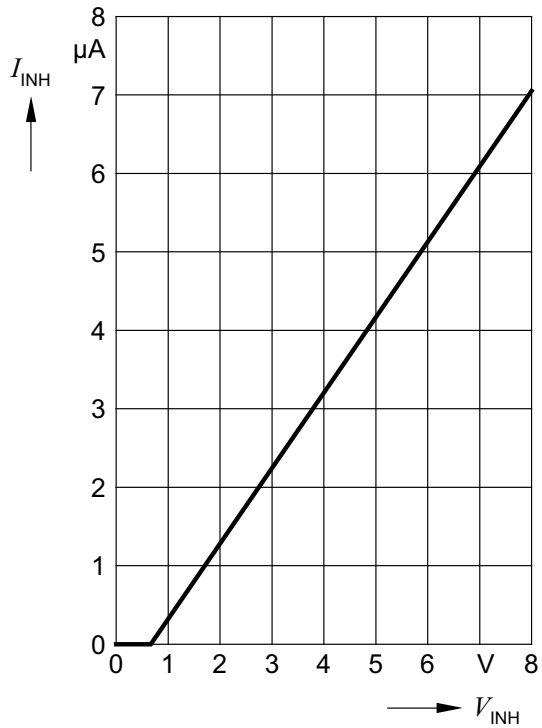
Drop voltage V_{Dr} versus output current I_Q (TLE4266-2G)



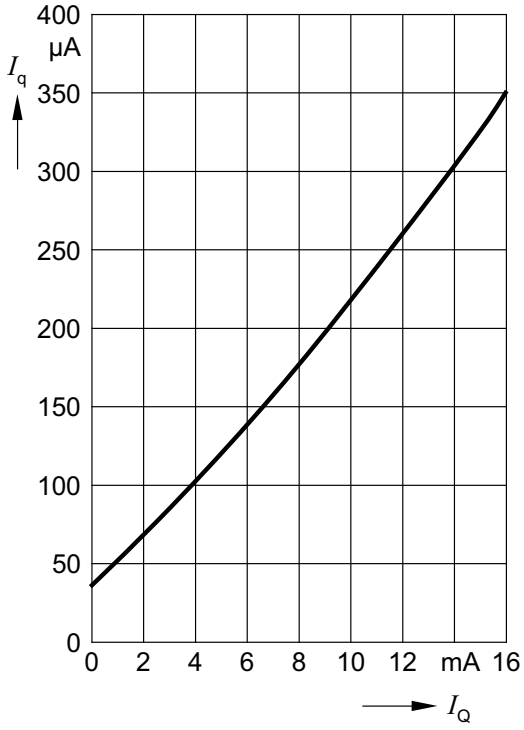
Output voltage V_Q versus input voltage V_I



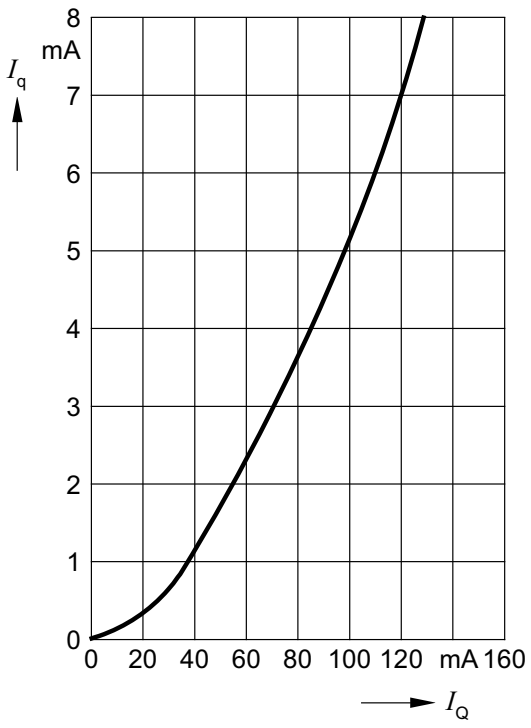
Inhibit current $I_{\overline{INH}}$ versus inhibit voltage $V_{\overline{INH}}$



Current consumption I_q versus output current I_Q



Current consumption I_q versus output current I_Q



5 Package information

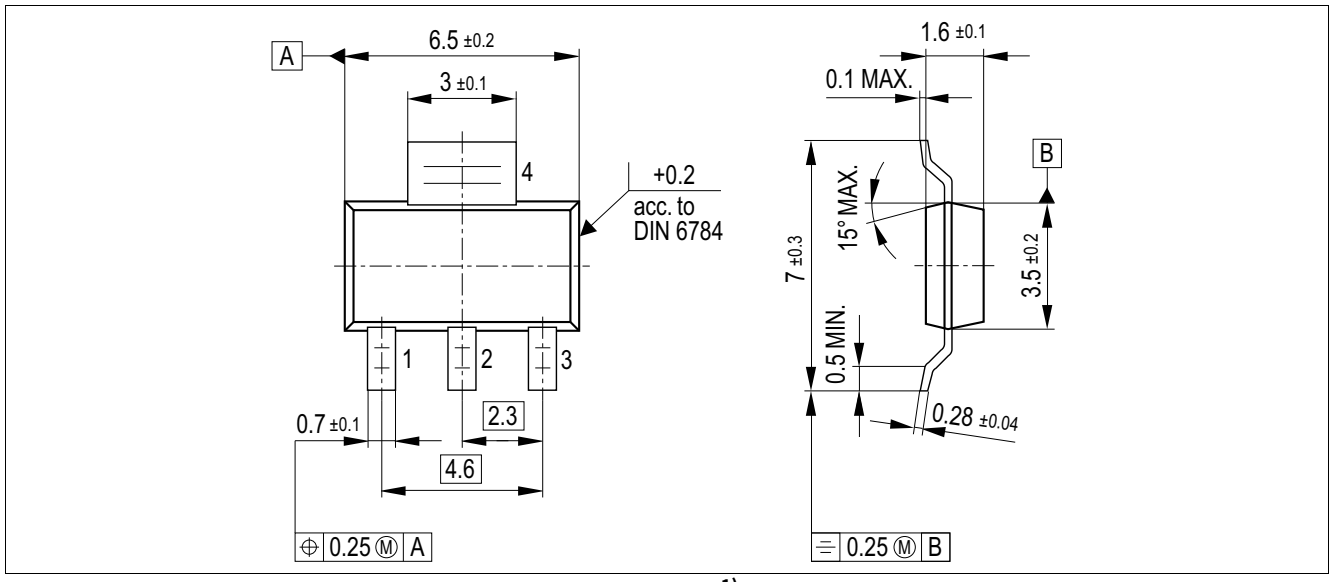


Figure 4 **PG-SOT223-4** (plastic small outline transistor)[1)]

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 (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

6 Revision history

Revision	Date	Changes
1.52	2024-06-05	Editorial change
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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