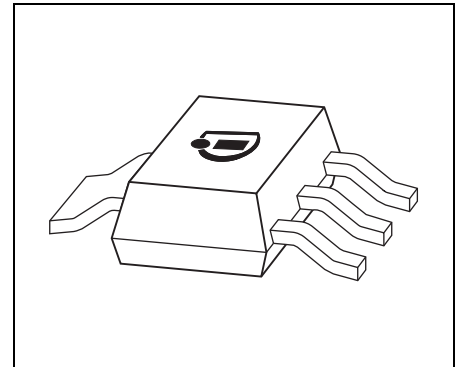




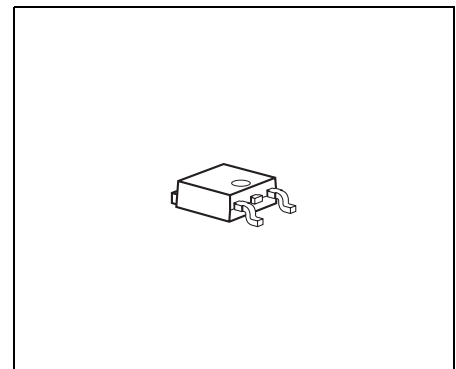
## Features

- Output voltage: 3.3 V/2.5 V  $\pm$  4%
- Current capability 400 mA
- Very low current consumption
- Short-circuit proof
- Reverse polarity proof
- Suitable for use in automotive electronics
- Green Product (RoHS compliant)
- AEC Qualified



## Functional Description

The TLE 4274 / 3.3V;2.5V is a voltage regulator available in a SOT223 and TO252 package. The IC regulates an input voltage up to 40 V to  $V_{Qrated} = 3.3 \text{ V}/2.5 \text{ V}$ . The maximum output current is 400 mA. The IC is short-circuit proof and has a shutdown circuit protecting it against overtemperature. The TLE 4274 is also available as 5 V, 8.5 V and 10 V version. Please refer to the data sheet TLE 4274.



## Dimensioning Information on External Components

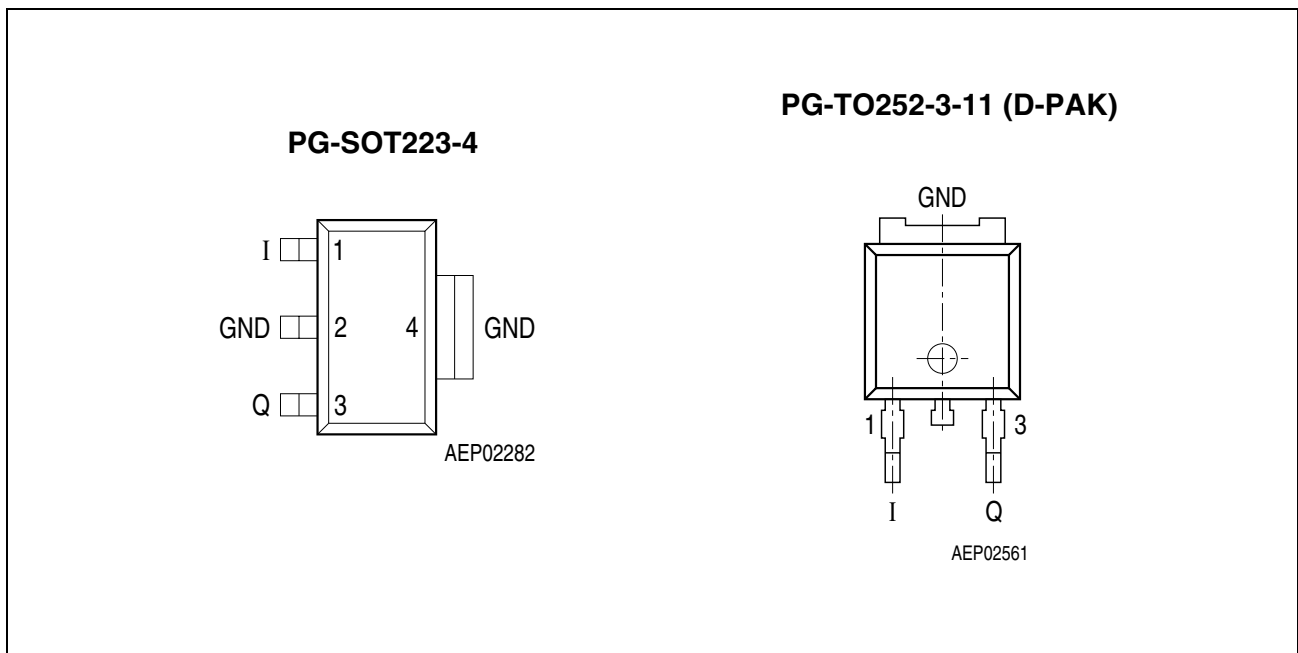
The input capacitor  $C_1$  is necessary for compensating line influences. Using a resistor of approx. 1  $\Omega$  in series with  $C_1$ , the oscillating of input inductivity and input capacitance can be damped. The output capacitor  $C_Q$  is necessary for the stability of the regulation circuit. Stability is guaranteed for capacities  $C_Q \geq 10 \mu\text{F}$  with an ESR of  $\leq 2.5 \Omega$  within the operating temperature range.

Type	Package
TLE 4274 GSV33	PG-SOT223-4
TLE 4274 DV33	PG-TO252-3-11
TLE 4274 GSV25	PG-SOT223-4

### Circuit Description

The control amplifier compares a reference voltage to a voltage that is proportional to the output voltage and drives the base of the series transistor via a buffer. Saturation control as a function of the load current prevents any oversaturation of the power element. The IC also includes a number of internal circuits for protection against:

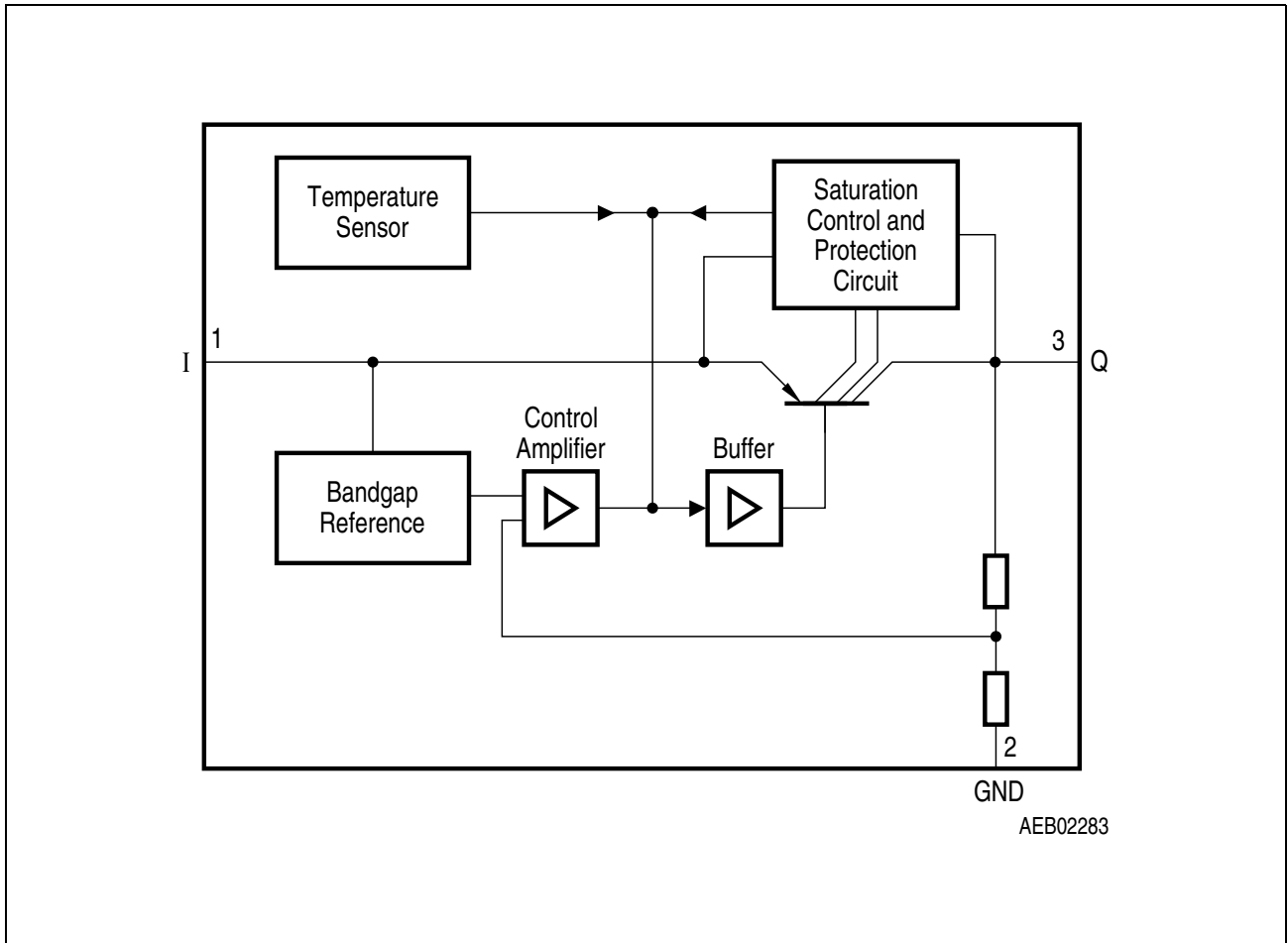
- Overload
- Overtemperature
- Reverse polarity



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

**Table 1** Pin Definitions and Functions

Pin No.	Symbol	Function
1	I	<b>Input;</b> block to ground directly at the IC with a ceramic capacitor.
2, 4	GND	<b>Ground;</b> PG-TO252-3-11: internally connected to heatsink
3	Q	<b>Output;</b> block to ground with capacitor $C_Q \geq 10 \mu\text{F}$ , $\text{ESR} \leq 2.5 \Omega$



**Figure 2**      **Block Diagram**

**Table 2 Absolute Maximum Ratings**
 $T_j = -40$  to  $150$  °C

Parameter	Symbol	Limit Values		Unit	Test Condition
		Min.	Max.		
<b>Input</b>					
Voltage	$V_I$	-42	45	V	–
Current	$I_I$	–	–	–	Internally limited
<b>Output</b>					
Voltage	$V_Q$	-1.0	40	V	–
Current	$I_Q$	–	–	–	Internally limited
<b>Ground</b>					
Current	$I_{GND}$	–	100	mA	–
<b>Temperature</b>					
Junction temperature	$T_j$	–	150	°C	–
Storage temperature	$T_{stg}$	-50	150	°C	–

*Note: Maximum ratings are absolute ratings; exceeding any one of these values may cause irreversible damage to the integrated circuit.*

**Table 3 Operating Range**

Parameter	Symbol	Limit Values		Unit	Remarks
		Min.	Max.		
Input voltage	$V_I$	4.7	40	V	–
Junction temperature	$T_j$	-40	150	°C	–
<b>Thermal Resistance</b>					
Junction ambient	$R_{thja}$	–	100	K/W	SOT223 <sup>1)</sup>
Junction ambient	$R_{thja}$	–	70	K/W	TO252 <sup>2)</sup>
Junction case	$R_{thjc}$	–	25	K/W	SOT223
Junction case	$R_{thjc}$	–	4	K/W	TO252

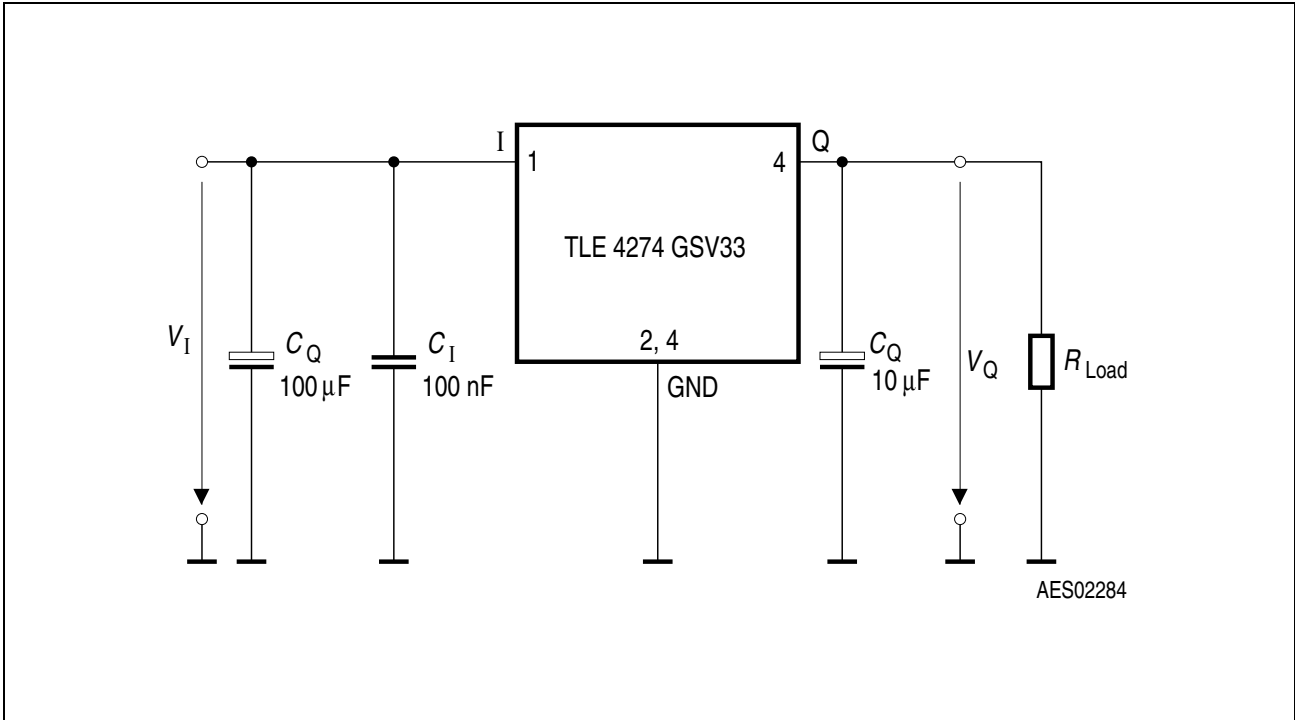
1) Soldered in, 1 cm<sup>2</sup> copper area at pin 4, FR4

2) Soldered in, minimal footprint, FR4

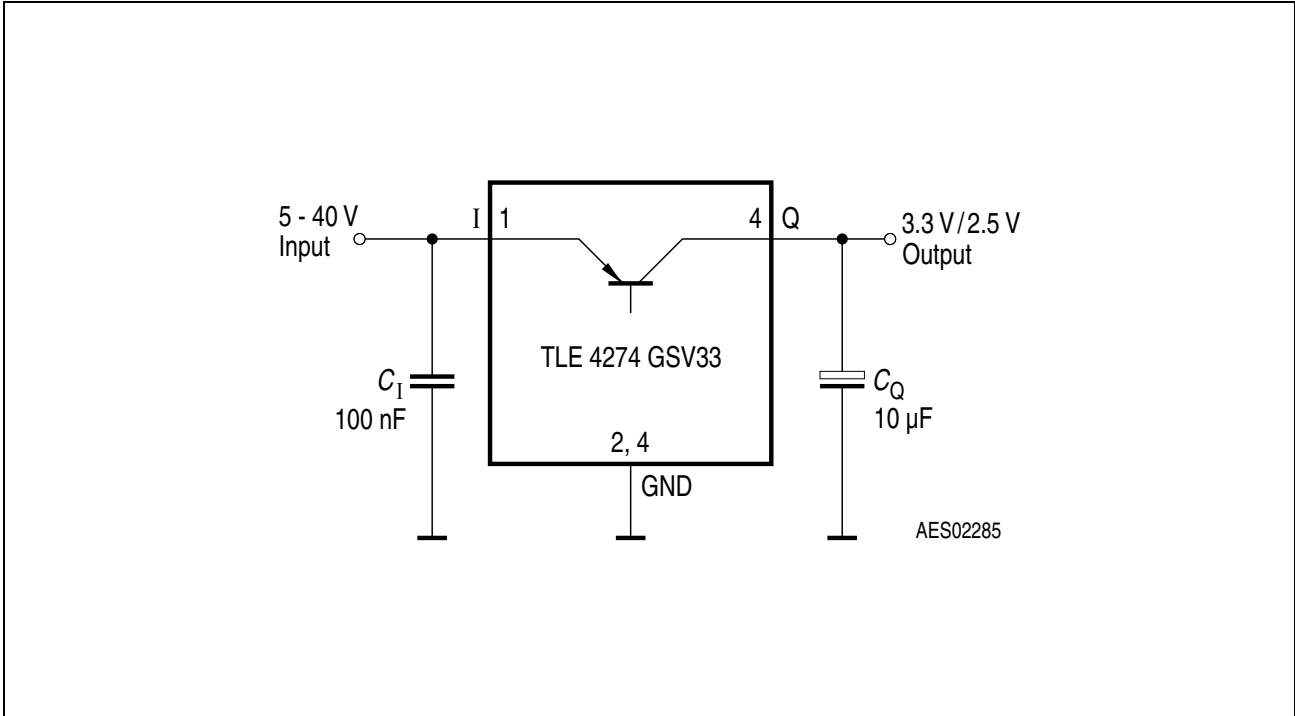
**Table 4 Characteristics**
 $V_I = 6\text{ V}; -40\text{ }^\circ\text{C} < T_j < 150\text{ }^\circ\text{C}$  (unless otherwise specified)

Parameter	Symbol	Limit Values			Unit	Measuring Condition
		Min.	Typ.	Max.		
Output voltage V33-Version	$V_Q$	3.17	3.3	3.44	V	$5\text{ mA} < I_Q < 400\text{ mA}$ $4.7\text{ V} < V_I < 28\text{ V}$
Output voltage V33-Version	$V_Q$	3.17	3.3	3.44	V	$5\text{ mA} < I_Q < 200\text{ mA}$ $4.7\text{ V} < V_I < 40\text{ V}$
Output voltage V25-Version	$V_Q$	2.4	2.5	2.6	V	$5\text{ mA} < I_Q < 400\text{ mA}$ $4.7\text{ V} < V_I < 28\text{ V}$
Output voltage V25-Version	$V_Q$	2.4	2.5	2.6	V	$5\text{ mA} < I_Q < 200\text{ mA}$ $4.7\text{ V} < V_I < 40\text{ V}$
Output current limitation <sup>1)</sup>	$I_Q$	400	600	–	mA	–
Current consumption; $I_q = I_I - I_Q$	$I_q$	–	100	220	$\mu\text{A}$	$I_Q = 1\text{ mA}$
Current consumption; $I_q = I_I - I_Q$	$I_q$	–	8	15	mA	$I_Q = 250\text{ mA}$
Current consumption; $I_q = I_I - I_Q$	$I_q$	–	20	30	mA	$I_Q = 400\text{ mA}$
Drop voltage <sup>1)</sup> V33-Version	$V_{dr}$	–	0.7	1.2	V	$I_Q = 300\text{ mA}$ $V_{dr} = V_I - V_Q$
Drop voltage <sup>1)</sup> V25-Version	$V_{dr}$	–	1.0	2.0	V	$I_Q = 300\text{ mA}$ $V_{dr} = V_I - V_Q$
Load regulation	$\Delta V_Q$	–	40	70	mV	$I_Q = 5\text{ mA to } 300\text{ mA};$ $V_I = 6\text{ V}$
Line regulation	$\Delta V_Q$	–	10	25	mV	$\Delta V_I = 12\text{ V to } 32\text{ V}$ $I_Q = 5\text{ mA}$
Power supply ripple rejection	$PSRR$	–	60	–	dB	$f_r = 100\text{ Hz};$ $V_r = 0.5\text{ Vpp}$
Temperature output voltage drift	$dV_Q/dT$	–	0.5	–	mV/K	–

1) Measured when the output voltage  $V_Q$  has dropped 100 mV from the nominal value obtained at  $V_I = 6\text{ V}$ .



**Figure 3 Measuring Circuit**



**Figure 4 Application Circuit**

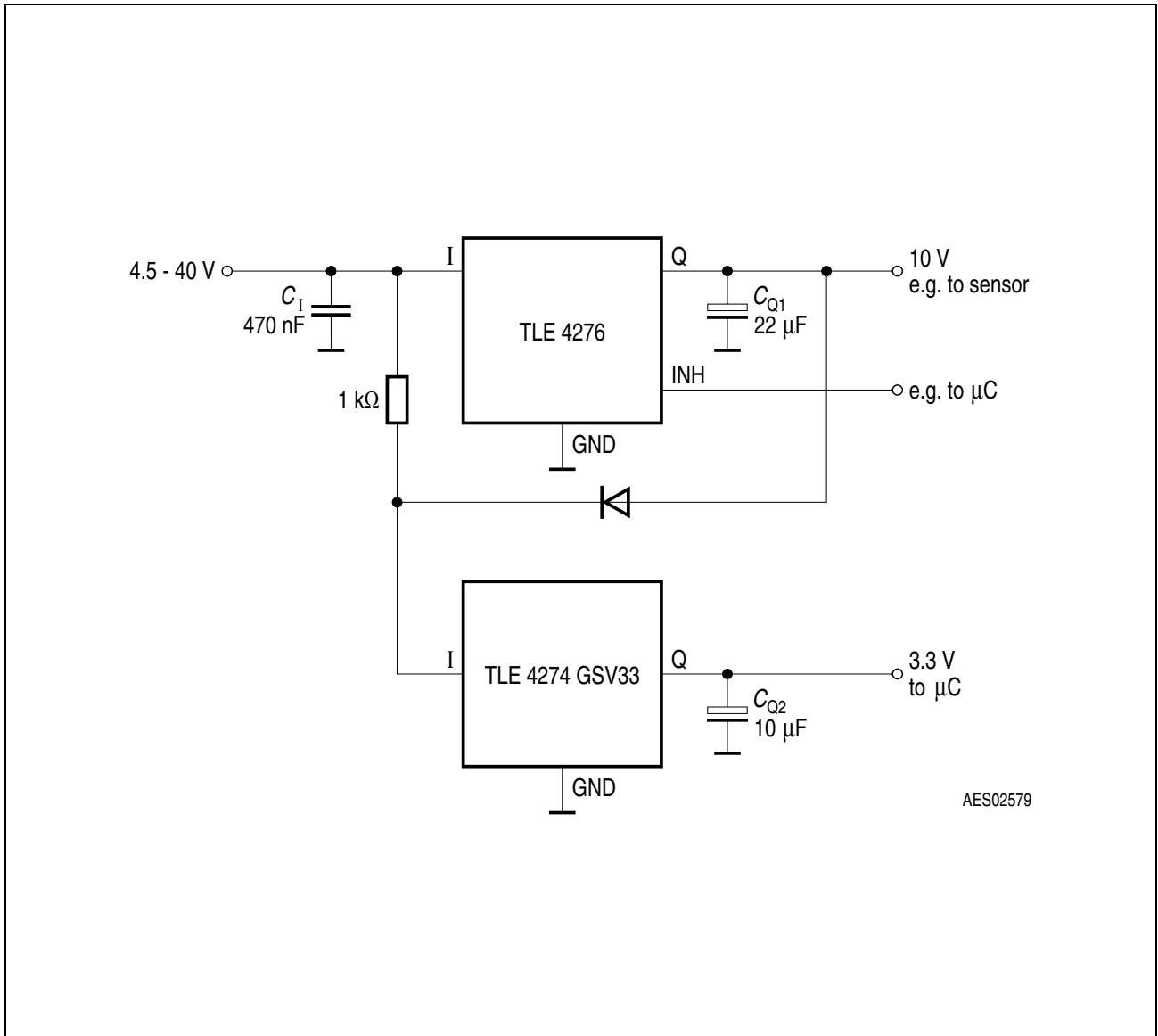
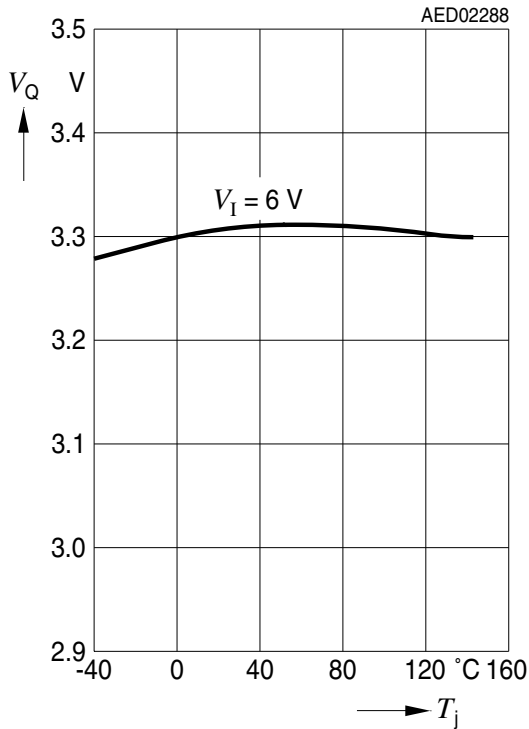


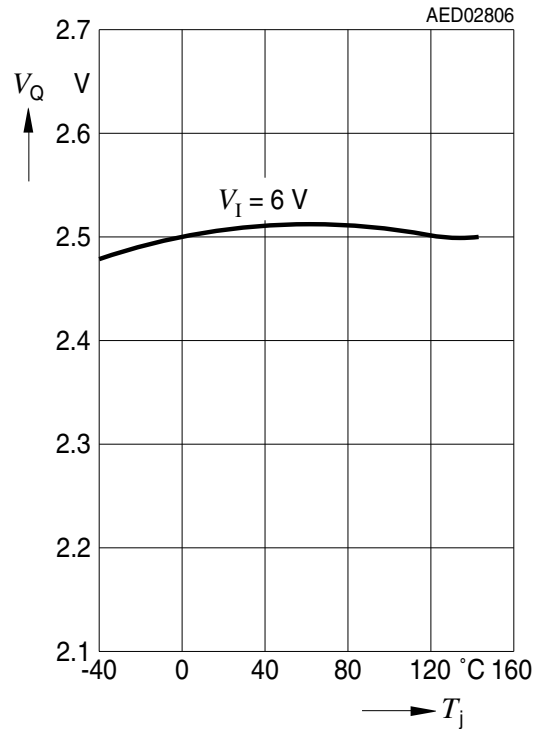
Figure 5 Application Example

Typical Performance Characteristics

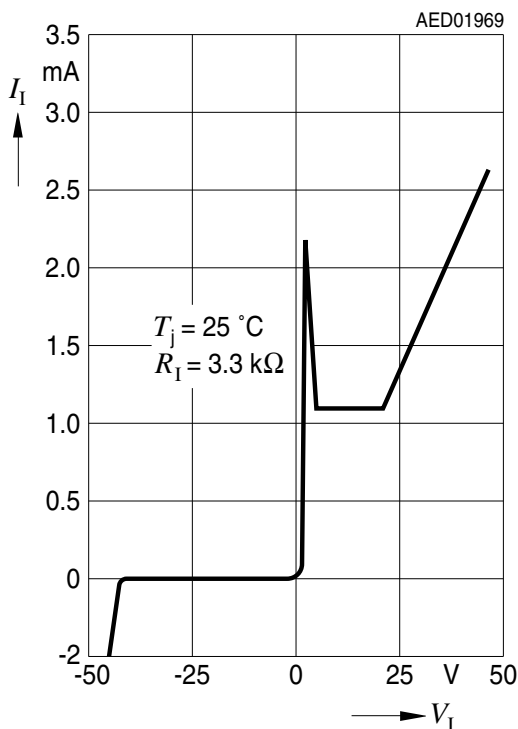
Output Voltage  $V_Q$  versus Junction Temperature  $T_j$  (V33-Version)



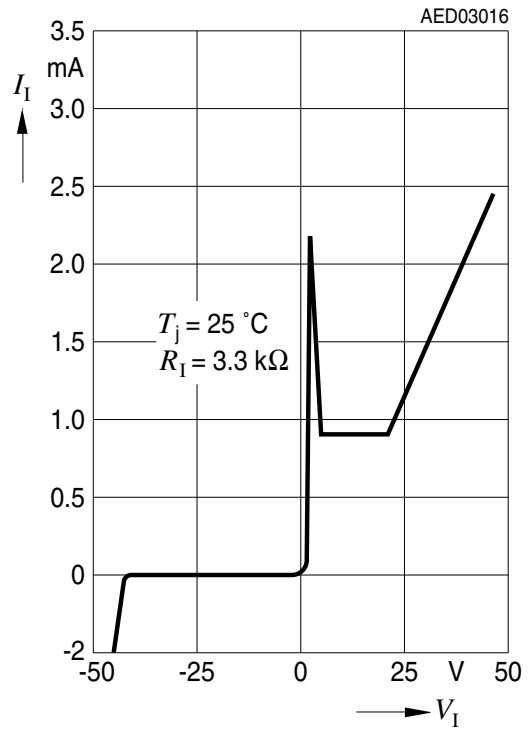
Output Voltage  $V_Q$  versus Junction Temperature  $T_j$  (V25-Version)



Input Current  $I_q$  versus Input Voltage  $V_I$  (V33-Version)

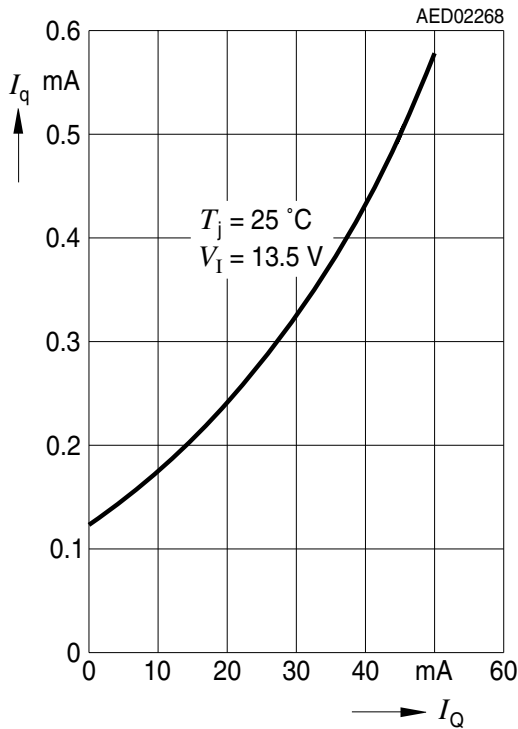


Input Current  $I_q$  versus Input Voltage  $V_I$  (V25-Version)

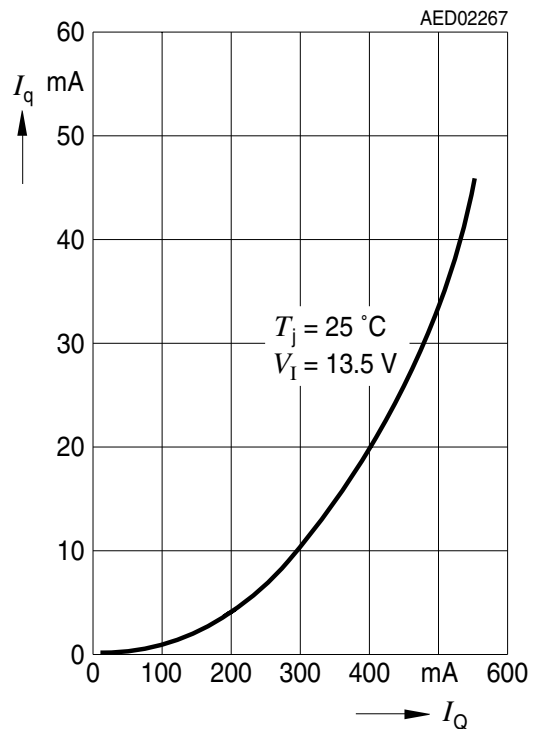




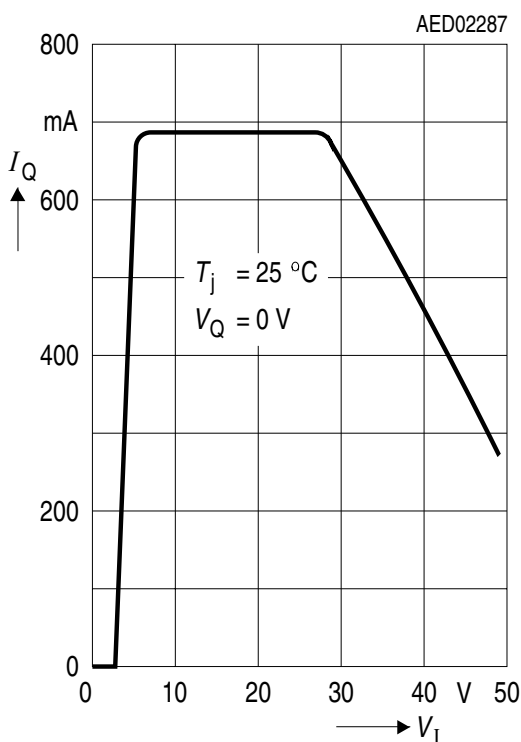
**Current Consumption  $I_q$  versus Output Current  $I_Q$  (low load)**



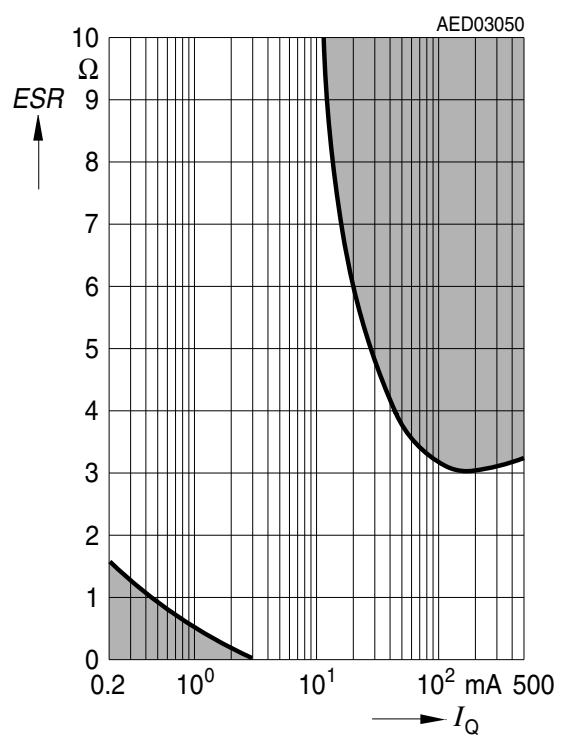
**Current Consumption  $I_q$  versus Output Current  $I_Q$  (high load)**



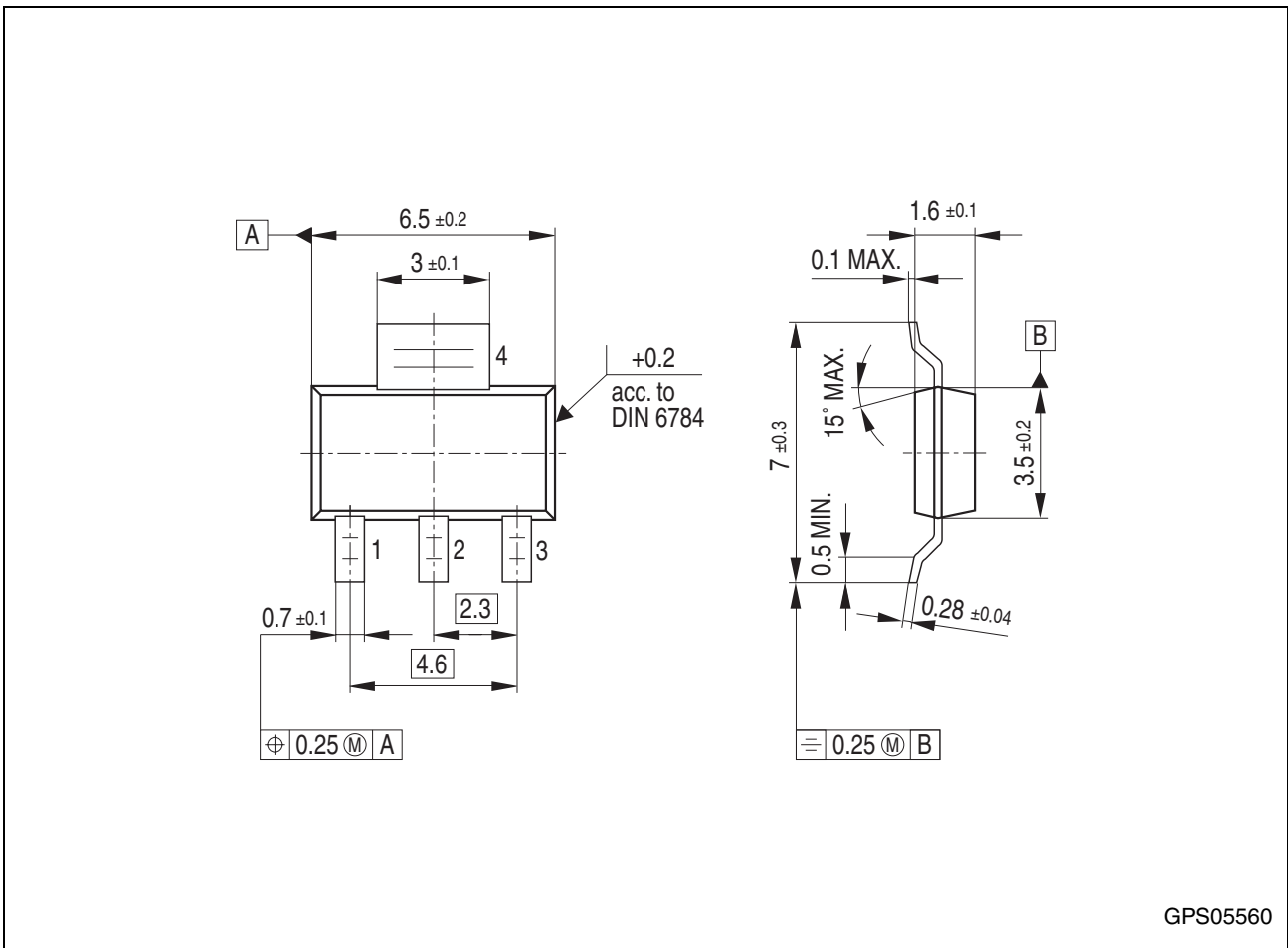
**Output Current  $I_Q$  versus Input Voltage  $V_I$**



**Region of Stability for  $C_Q = 10 \mu F$**



Package Outlines



GPS05560

Figure 6 PG-SOT223-4 (Plastic Small Outline Transistor)

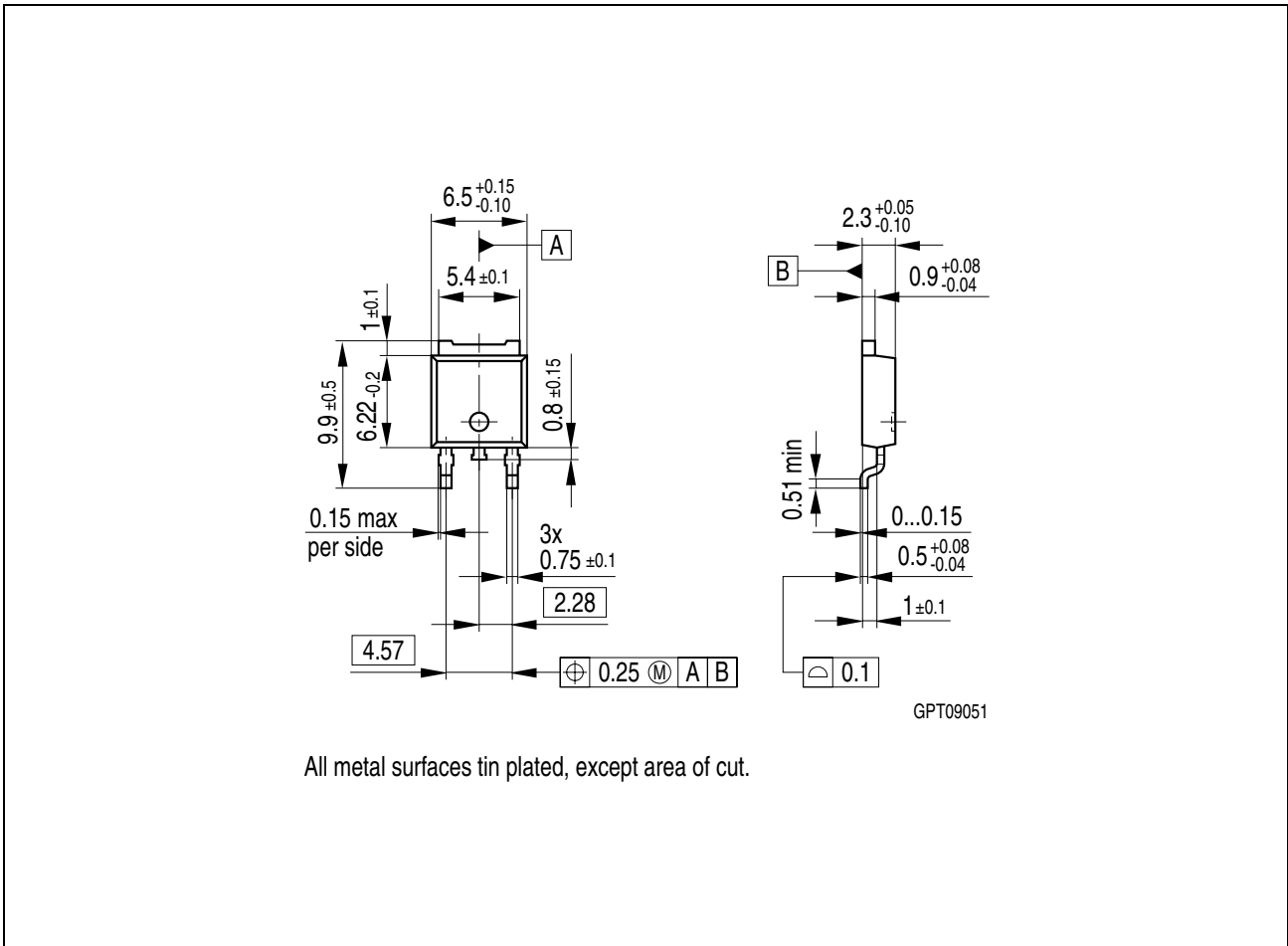
Green Product (RoHS compliant)

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).

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SMD = Surface Mounted Device

Dimensions in mm



**Figure 7** PG-TO252-3-11 (Plastic Transistor Single Outline)

**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).

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SMD = Surface Mounted Device

Dimensions in mm

## Revision History

Version	Date	Changes
Rev. 2.3	2008-03-10	Simplified package name to PG-SOT223-4. No modification of released product.
Rev. 2.2	2007-03-20	Initial version of RoHS-compliant derivate of TLE 4274 / 3.3V;2.5V <b>Page 1</b> : AEC certified statement added <b>Page 1</b> and <b>Page 10</b> : RoHS compliance statement and Green product feature added <b>Page 1</b> and <b>Page 10</b> : Package changed to RoHS compliant version Legal Disclaimer updated

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