

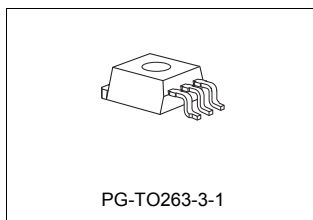
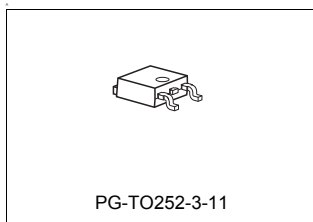
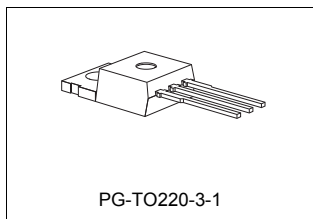
# Low Drop Voltage Regulator

**TLE 4274**



## Features

- Output voltage 5 V, 8.5 V or 10 V
- Output voltage tolerance  $\leq \pm 4\%$
- Current capability 400 mA
- Low-drop voltage
- Very low current consumption
- Short-circuit proof
- Reverse polarity proof
- Suitable for use in automotive electronics
- Green Product (RoHS compliant) version of TLE 4274
- AEC qualified



## Functional Description

The TLE 4274 is a low drop voltage regulator available in a TO220, TO252 and TO263 package. The IC regulates an input voltage up to 40 V to  $V_{Qrated} = 5.0\text{ V (V50)}$ ,  $8.5\text{ V (V85)}$  and  $10\text{ V (V10)}$ . The maximum output current is 400 mA. The IC is short-circuit proof and incorporates temperature protection that disables the IC at overtemperature. A 3.3 V and 2.5 V version is also available. For information about the low output voltage types please refer to the data sheet TLE 4274 / 3.3 V; 2.5 V.

Type	Package
TLE 4274 V10	PG-TO220-3-1 (RoHS compliant)
TLE 4274 V50	PG-TO220-3-1 (RoHS compliant)
TLE 4274 V85	PG-TO220-3-1 (RoHS compliant)
TLE 4274 DV50	PG-TO252-3-11 (RoHS compliant)
TLE 4274 GV10	PG-TO263-3-1 (RoHS compliant)
TLE 4274 GV50	PG-TO263-3-1 (RoHS compliant)
TLE 4274 GV85	PG-TO263-3-1 (RoHS compliant)

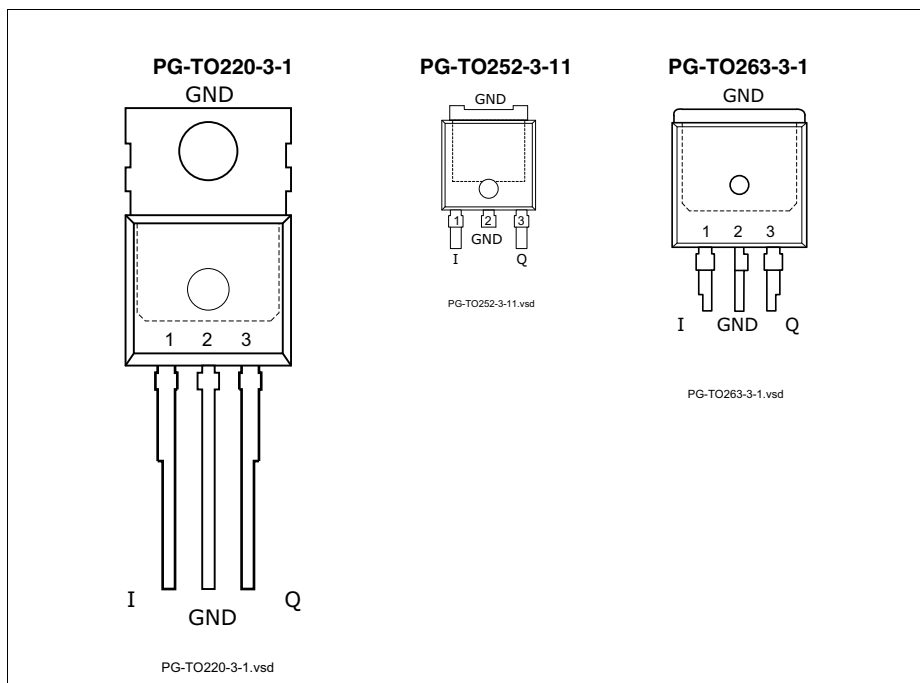
## Dimensioning Information on External Components

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 inductivity and input capacitance can be damped. The output capacitor  $C_Q$  is necessary for the stability of the regulation circuit. Stability is guaranteed at values  $C_Q \geq 22\ \mu\text{F}$  and an ESR of  $\leq 3\ \Omega$  within the operating temperature range.

## 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:

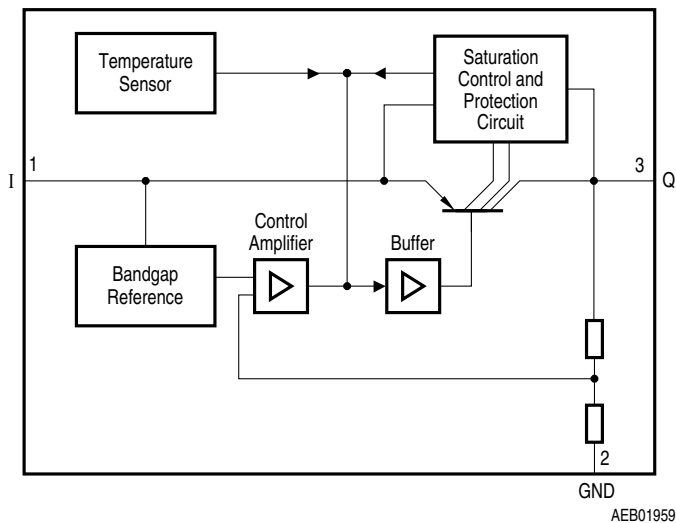
- Overload
- Overtemperature
- Reverse polarity



**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	GND	<b>Ground</b>
3	Q	<b>Output</b> ; block to ground with a $\geq 22 \mu\text{F}$ capacitor, $\text{ESR} \leq 3 \Omega$ .
TAB	-	<b>TAB</b> ; connect to heatsink and GND to improve thermal performance



**Figure 2**      **Block Diagram**

**Table 2 Absolute Maximum Ratings**
 $T_j = -40$  to  $150\text{ }^{\circ}\text{C}$ 

Parameter	Symbol	Limit Values		Unit	Test Condition
		Min.	Max.		
Input					
Voltage	$V_I$	-42	45	V	—
Current	$I_I$	—	—	—	Internally limited
Output					
Voltage	$V_Q$	-1.0	40	V	—
Current	$I_Q$	—	—	—	Internally limited
Ground					
Current	$I_{\text{GND}}$	—	100	mA	—
Temperature					
Junction temperature	$T_j$	—	150	°C	—
Storage temperature	$T_{\text{stg}}$	-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; V50, DV50, GV50	$V_I$	5.5	40	V	–
Input voltage, V85, GV85	$V_I$	9.0	40	V	–
Input voltage, V10, GV10	$V_I$	10.5	40	V	–
Junction temperature	$T_j$	-40	150	$^{\circ}\text{C}$	–

**Thermal Resistance**

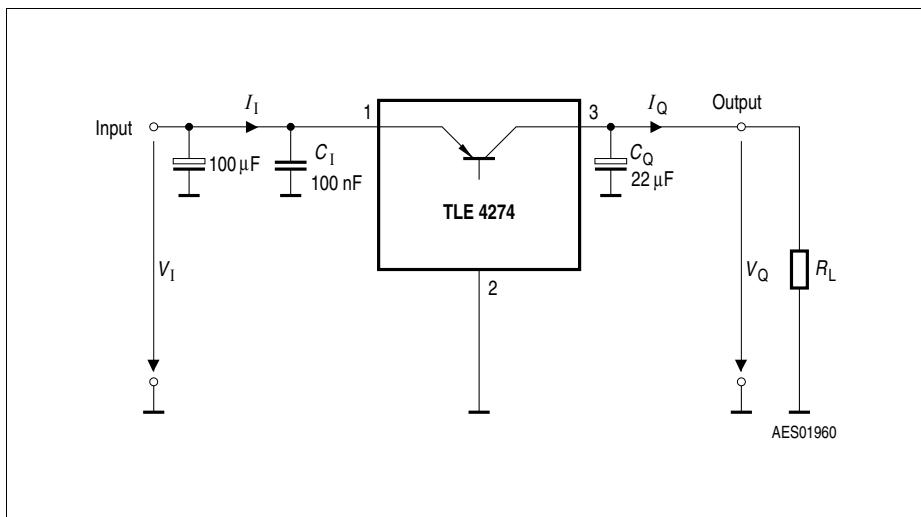
Junction ambient	$R_{\text{thja}}$	–	65	K/W	TO220 <sup>1)</sup>
Junction ambient	$R_{\text{thja}}$	–	78	K/W	TO252 <sup>1)</sup>
Junction ambient	$R_{\text{thja}}$	–	52	K/W	TO263 <sup>1)</sup>
Junction case	$R_{\text{thjc}}$	–	4	K/W	–

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

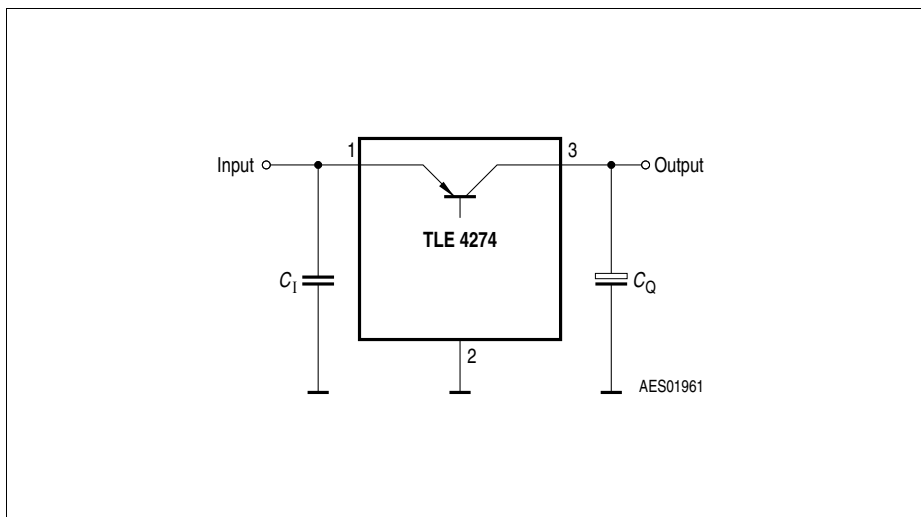
**Table 4 Characteristics**
 $V_I = 13.5 \text{ V}; -40^\circ\text{C} < T_J < 150^\circ\text{C}$  (unless otherwise specified)

Parameter	Symbol	Limit Values			Unit	Measuring Conditions
		Min.	Typ.	Max.		
Output voltage V50-Version	$V_Q$	4.8	5	5.2	V	$5 \text{ mA} < I_Q < 400 \text{ mA}$ $6 \text{ V} < V_I < 28 \text{ V}$
Output voltage V50-Version	$V_Q$	4.8	5	5.2	V	$5 \text{ mA} < I_Q < 200 \text{ mA}$ $6 \text{ V} < V_I < 40 \text{ V}$
Output voltage V85-Version	$V_Q$	8.16	8.5	8.84	V	$5 \text{ mA} < I_Q < 400 \text{ mA}$ $9.5 \text{ V} < V_I < 28 \text{ V}$
Output voltage V85-Version	$V_Q$	8.16	8.5	8.84	V	$5 \text{ mA} < I_Q < 200 \text{ mA}$ $9.5 \text{ V} < V_I < 40 \text{ V}$
Output voltage V10-Version	$V_Q$	9.6	10	10.4	V	$5 \text{ mA} < I_Q < 400 \text{ mA}$ $11 \text{ V} < V_I < 28 \text{ V}$
Output voltage V10-Version	$V_Q$	9.6	10	10.4	V	$5 \text{ mA} < I_Q < 200 \text{ mA}$ $11 \text{ V} < V_I < 40 \text{ V}$
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	$I_Q = 250 \text{ mA}$
	$I_q$	–	20	30	mA	$I_Q = 400 \text{ mA}$
Drop voltage <sup>1)</sup>	$V_{dr}$	–	250	500	mV	$I_Q = 250 \text{ mA}$ $V_{dr} = V_I - V_Q$
Load regulation	$\Delta V_Q$	–	20	50	mV	$I_Q = 5 \text{ mA}$ to $400 \text{ mA}$
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	$f_r = 100 \text{ Hz};$ $V_r = 0.5 \text{ V}_{pp}$
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  $V_I = 13.5 \text{ V}$ .



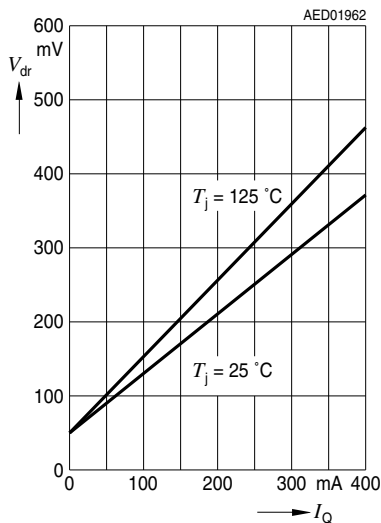
**Figure 3 Measuring Circuit**



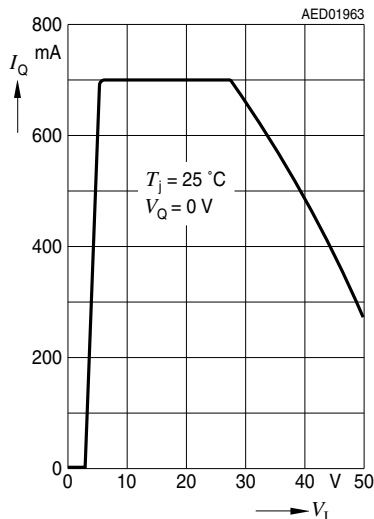
**Figure 4 Application Circuit**

## Typical Performance Characteristics (V50, V85 and V10)

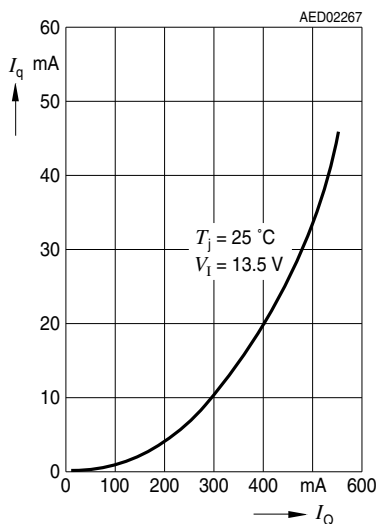
**Drop Voltage  $V_{dr}$  versus Output Current  $I_Q$**



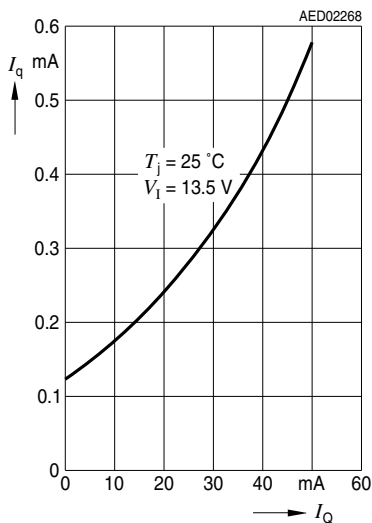
**Output Current  $I_Q$  versus Input Voltage  $V_I$**



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



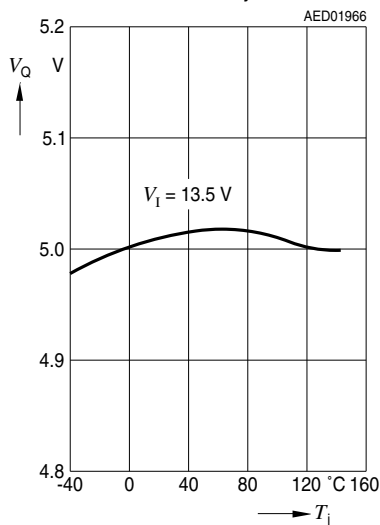
**Current Consumption  $I_q$  versus Output Current  $I_Q$  (low load)**



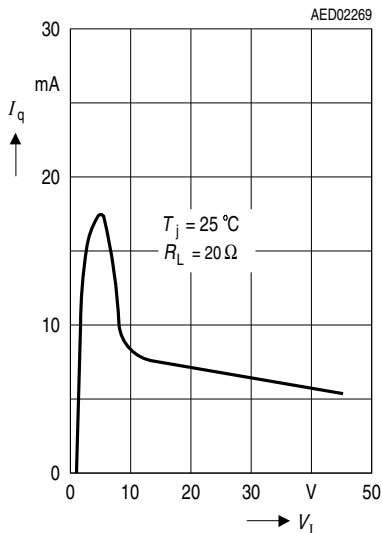


## Typical Performance Characteristics (V50)

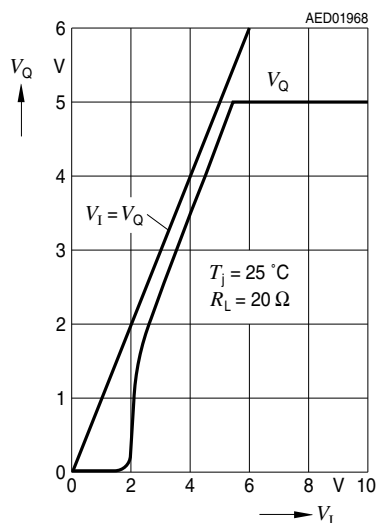
**Output Voltage  $V_Q$  versus Junction Temperature  $T_j$**



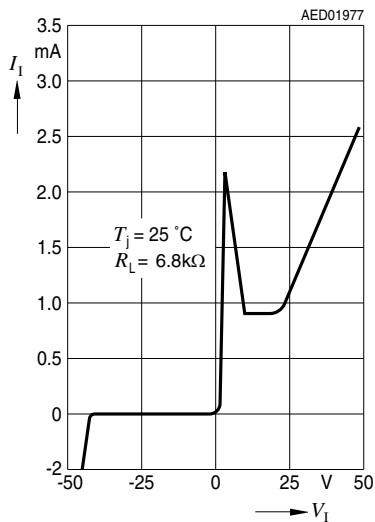
**Current Consumption  $I_q$  versus Input Voltage  $V_I$**



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

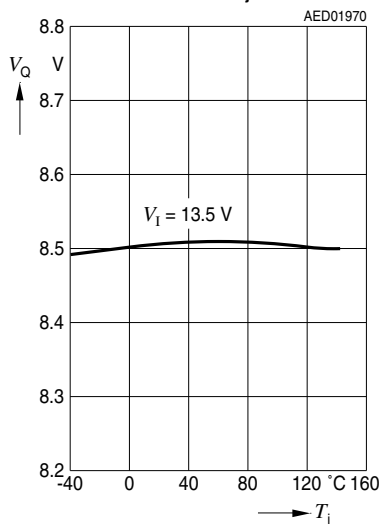


**Input Current  $I_I$  versus Input Voltage  $V_I$**

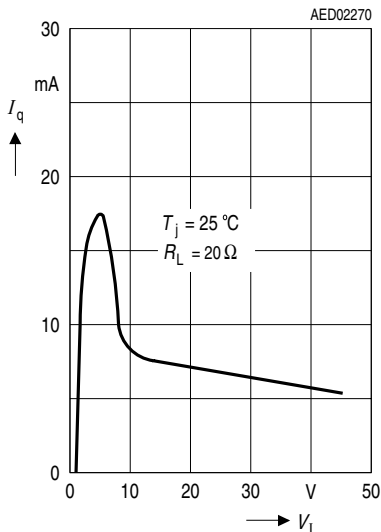


# Typical Performance Characteristics for V85

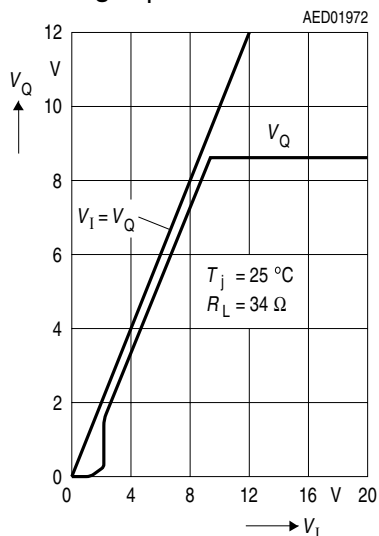
**Output Voltage  $V_Q$  versus Junction Temperature  $T_j$**



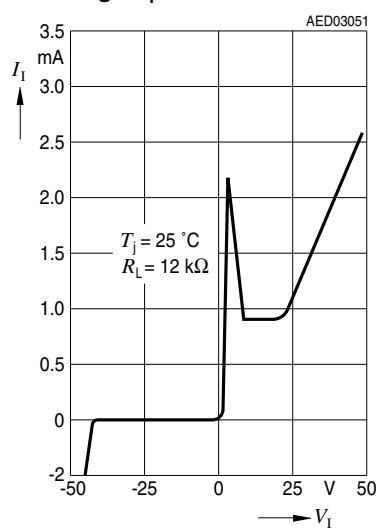
**Current Consumption  $I_q$  versus Input Voltage  $V_I$**



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

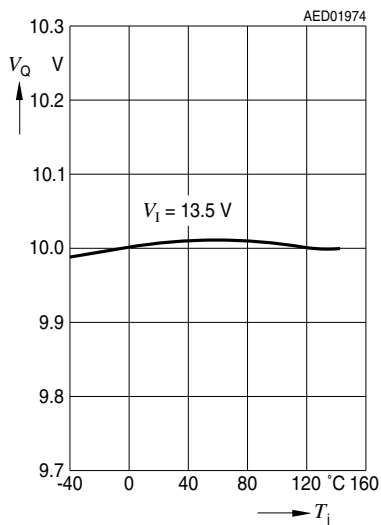


**Input Current  $I_I$  versus Input Voltage  $V_I$**

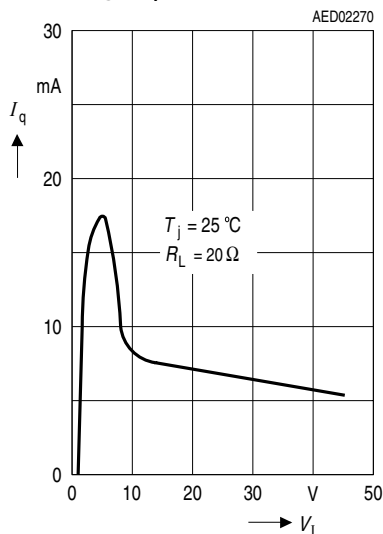


# Typical Performance Characteristics for V10

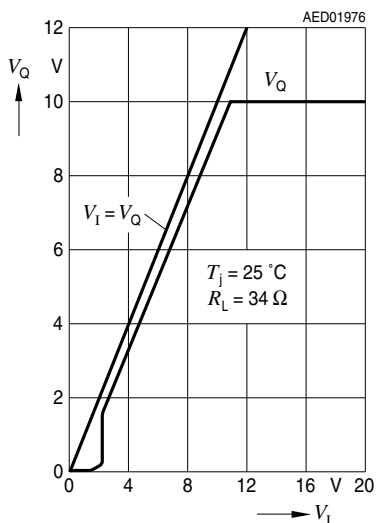
**Output Voltage  $V_Q$  versus Junction Temperature  $T_j$**



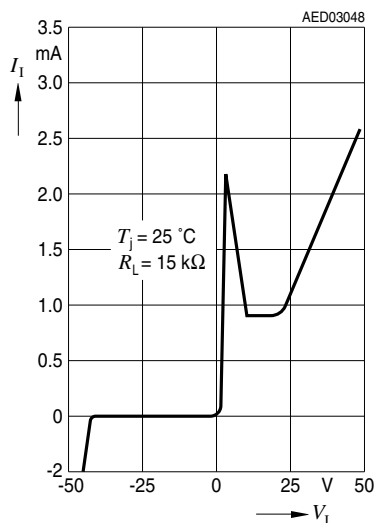
**Current Consumption  $I_q$  versus Input Voltage  $V_I$**



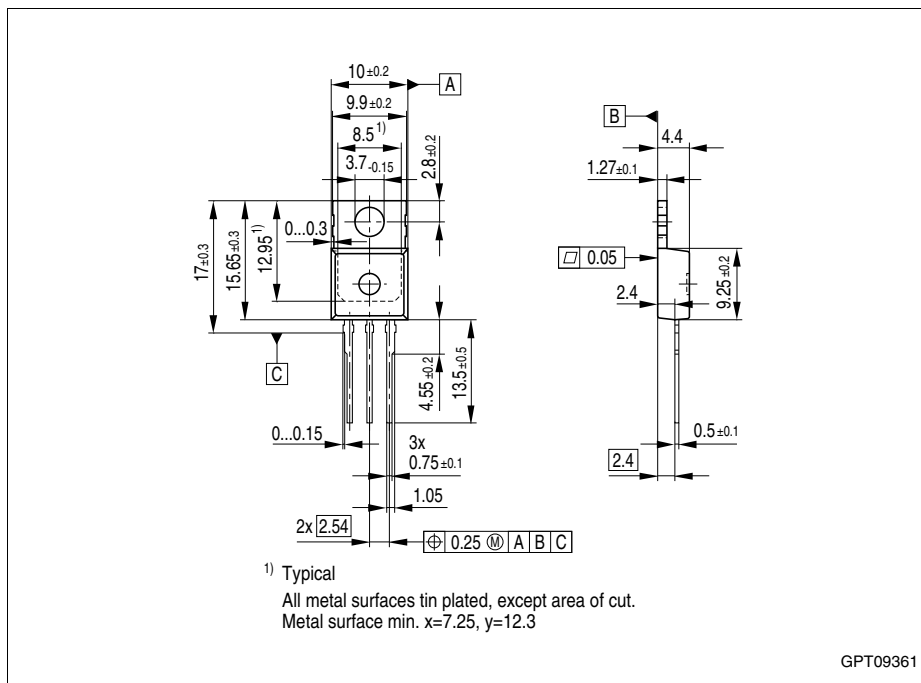
**Output Voltage  $V_Q$  versus Input Voltage  $V_I$**



**Input Current  $I_I$  versus Input Voltage  $V_I$**



## Package Outlines



**Figure 5 PG-TO220-3-1 (Plastic Transistor Single Outline)**

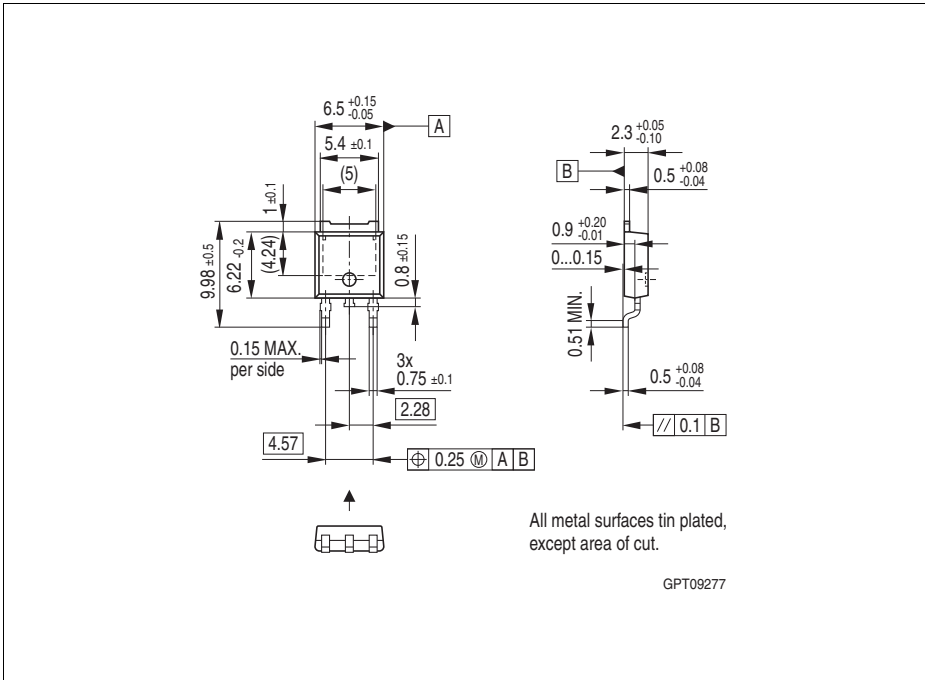
## Green Product (RoHS-Compliant)

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



**Figure 6** PG-TO252-3-11 (Plastic Transistor Single Outline)

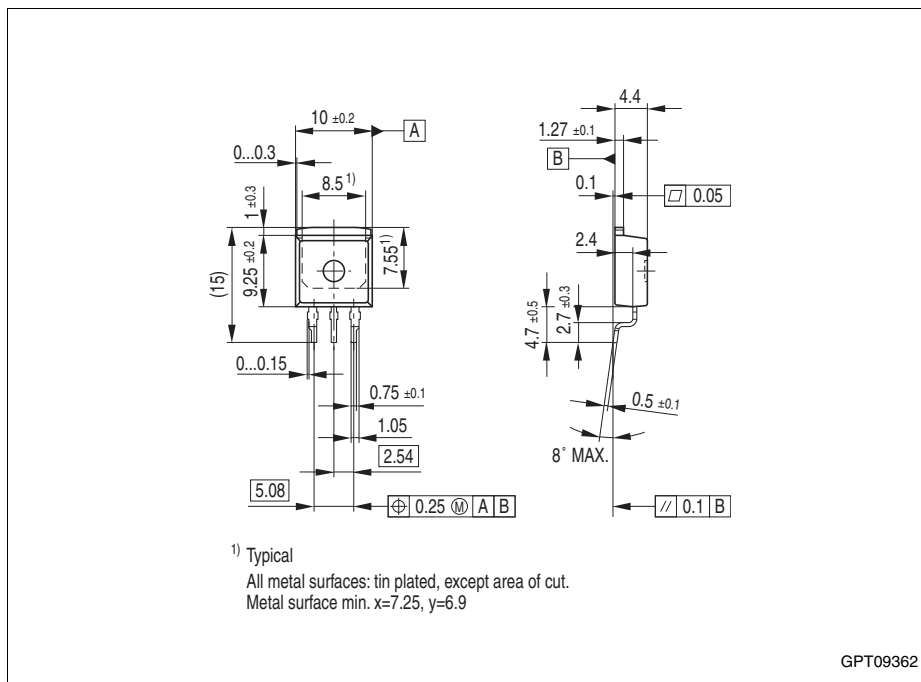
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SMD = Surface Mounted Device

Dimensions in mm



**Figure 7 PG-TO263-3-1 (Plastic Transistor Single Outline)**

### Green Product (RoHS-Compliant)

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SMD = Surface Mounted Device

Dimensions in mm

## Revision History

Version	Date	Changes
Rev. 1.6	2007-02-16	Updated Infineon logo Added "AEC" and "Green" logo Added "Green Product" and "AEC qualified" to the feature list Added "Green Product" remark Updated Package Names to "PG-xxx" Removed leadframe variant "P-TO-252-1" Disclaimer Update
Rev. 1.7	2011-01-20	Added TAB potential to the package outline

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