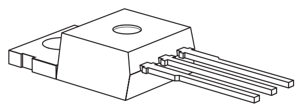
Low Drop Voltage Regulator

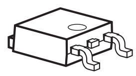
TLE 4274

Features

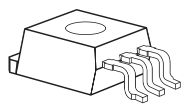
- Output voltage 5 V, 8.5 V or 10 V
- Output voltage tolerance ≤ ±4%
- Current capability 400 mA
- Low-drop voltage
- Very low current consumption
- Short-circuit proof
- Reverse polarity proof
- Suitable for use in automotive electronics
- Green Product (RoHS compliant) version of TLE 4274
- AEC qualified



PG-TO220-3-1



PG-TO252-3-11



PG-TO263-3-1

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 V (V50), 8.5 V (V85) and 10 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 Ω 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 $C_Q \geq 22$ µF and an ESR of ≤ 3 Ω 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

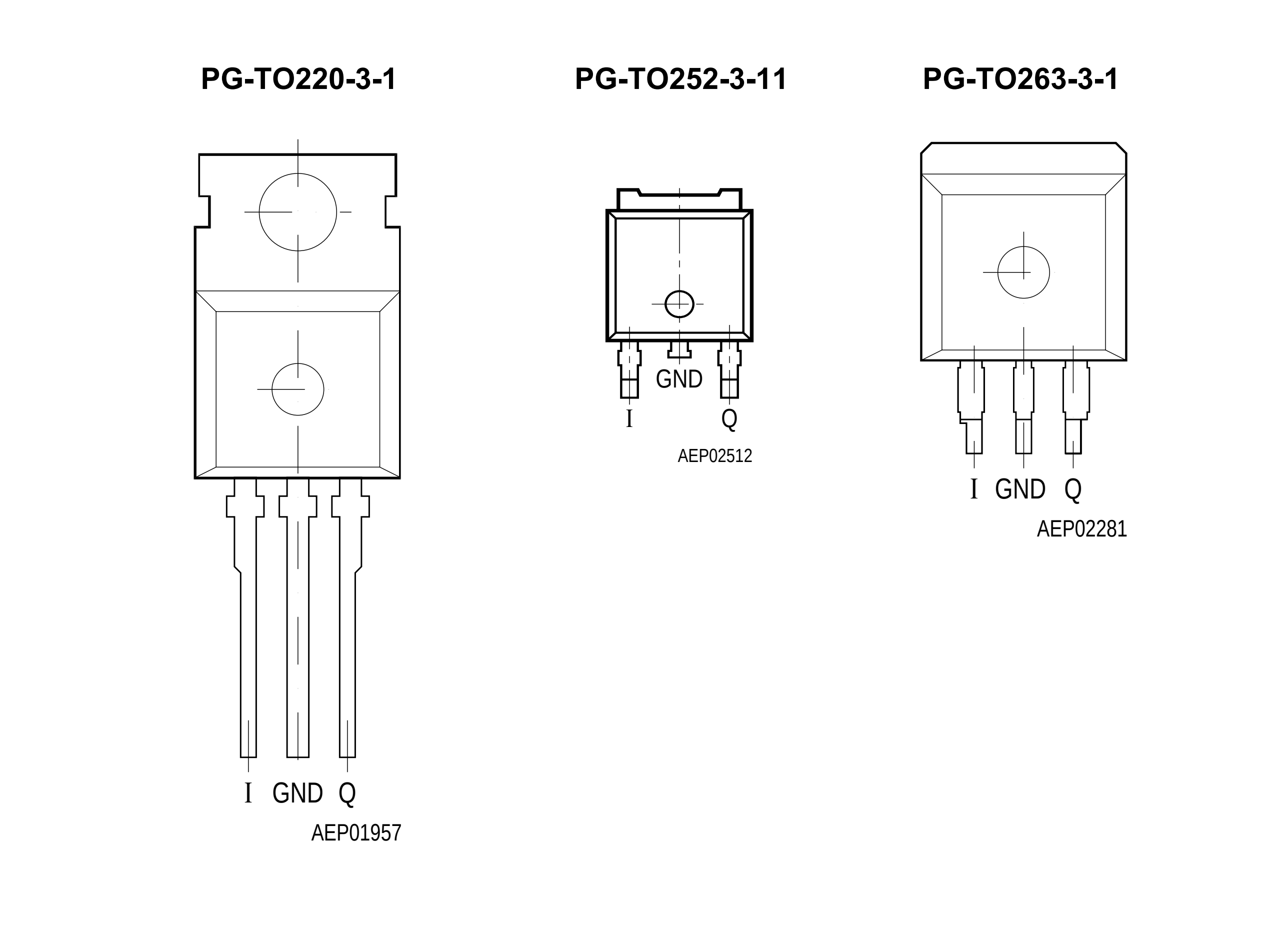


Figure 1 **Pin Configuration** (top view)

Table 1 **Pin Definitions and Functions**

Pin No.	Symbol	Function
1	I	**Input;** block to ground directly at the IC with a ceramic capacitor.
2	GND	**Ground**
3	Q	**Output;** block to ground with a ≥ 22 µF capacitor, ESR ≤ 3 Ω.

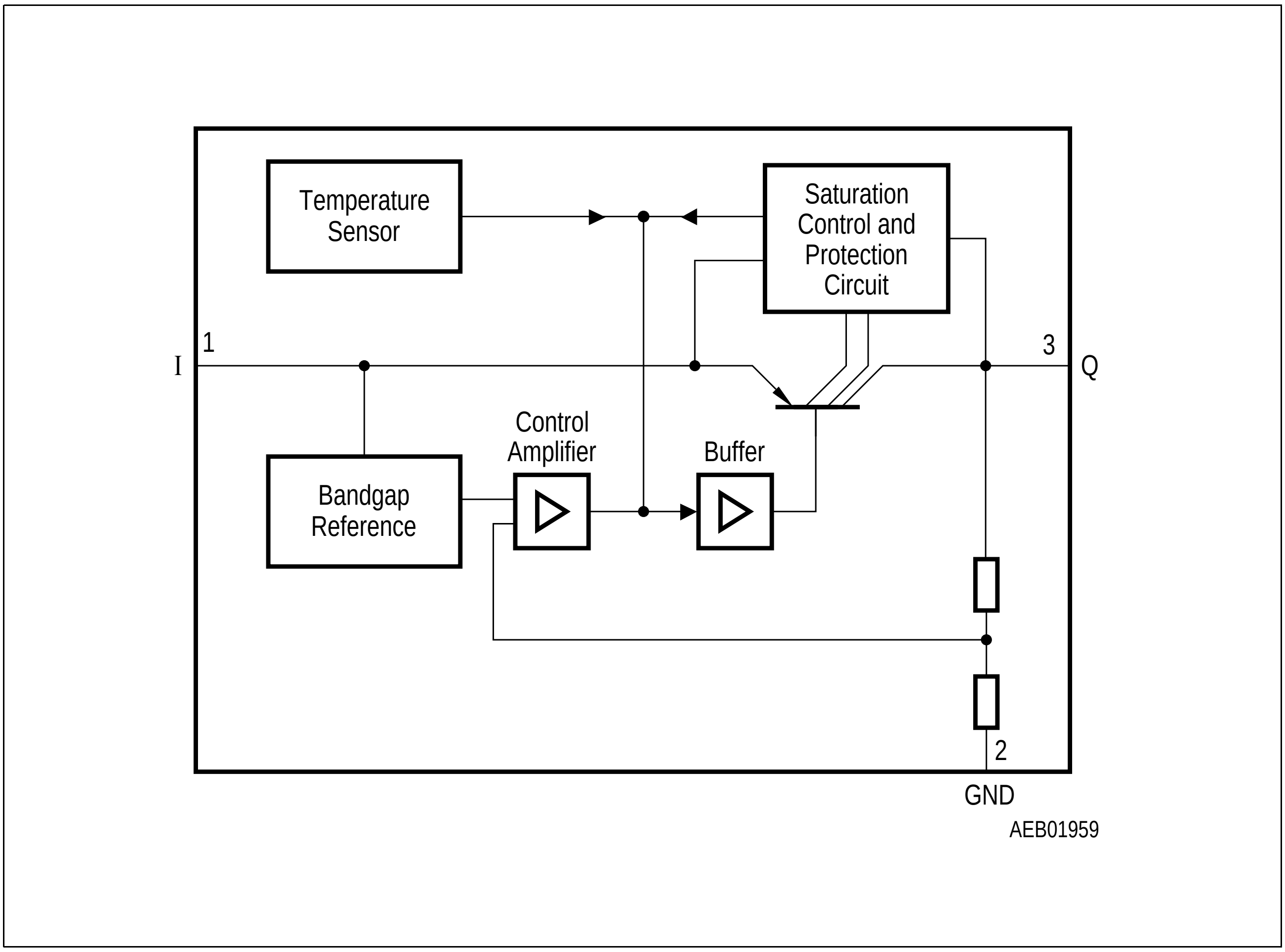


Figure 2 Block Diagram

Table 2 Absolute Maximum Ratings

T_j = -40 to 150 °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_{GND}	–	100	mA	–
Temperature					
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; 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	°C	–
Thermal Resistance					
Junction ambient	R_{thja}	–	65	K/W	TO220[1)]
Junction ambient	R_{thja}	–	78	K/W	TO252[1)]
Junction ambient	R_{thja}	–	52	K/W	TO263[1)]
Junction case	R_{thjc}	–	4	K/W	–

1) Worst case; regarding peak temperature, zero airflow mounted on PCB 80 × 80 × 1.5 mm^3, 300 mm^2 heat sink area.

Table 4 Characteristics

V_I = 13.5 V; -40 °C < T_j < 150 °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 mA < I_Q < 400 mA 6 V < V_I < 28 V
Output voltage V50-Version	V_Q	4.8	5	5.2	V	5 mA < I_Q < 200 mA 6 V < V_I < 40 V
Output voltage V85-Version	V_Q	8.16	8.5	8.84	V	5 mA < I_Q < 400 mA 9.5 V < V_I < 28 V
Output voltage V85-Version	V_Q	8.16	8.5	8.84	V	5 mA < I_Q < 200 mA 9.5 V < V_I < 40 V
Output voltage V10-Version	V_Q	9.6	10	10.4	V	5 mA < I_Q < 400 mA 11 V < V_I < 28 V
Output voltage V10-Version	V_Q	9.6	10	10.4	V	5 mA < I_Q < 200 mA 11 V < V_I < 40 V
Output current limitation[1)]	I_Q	400	600	–	mA	–
Current consumption; $I_q = I_I - I_Q$	I_q	–	100	220	µA	I_Q = 1 mA
Current consumption; $I_q = I_I - I_Q$	I_q I_q	– –	8 20	15 30	mA mA	I_Q = 250 mA I_Q = 400 mA
Drop voltage[1)]	V_{dr}	–	250	500	mV	I_Q = 250 mA $V_{dr} = V_I - V_Q$
Load regulation	ΔV_Q	–	20	50	mV	I_Q = 5 mA to 400 mA
Line regulation	ΔV_Q	–	10	25	mV	ΔV_I = 12 V to 32 V I_Q = 5 mA
Power supply ripple rejection	$PSRR$	–	60	–	dB	f_r = 100 Hz; V_r = 0.5 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 = 13.5 V.

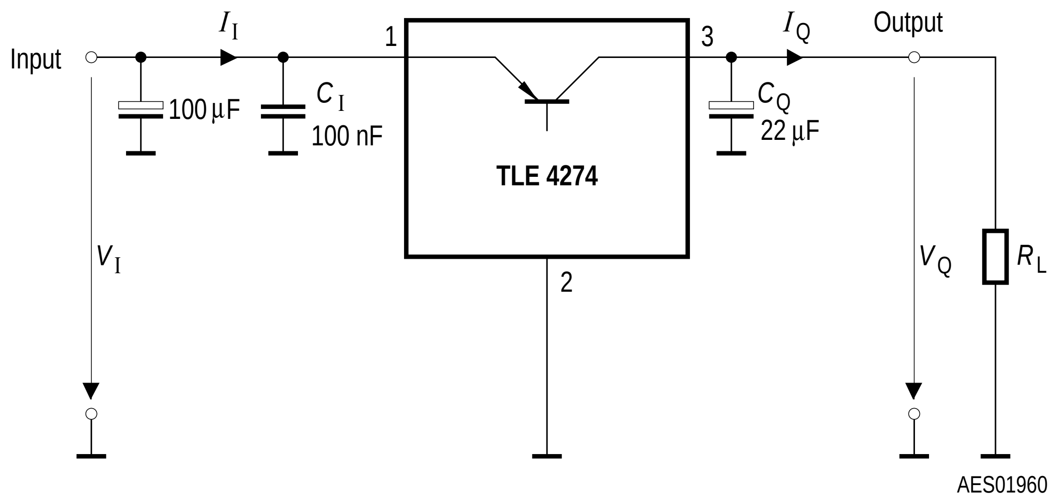


Figure 3 Measuring Circuit

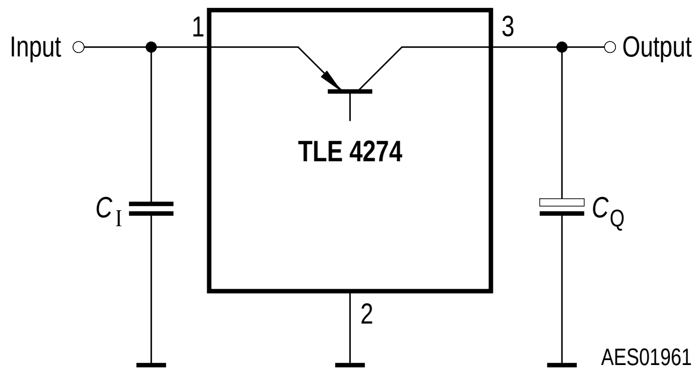
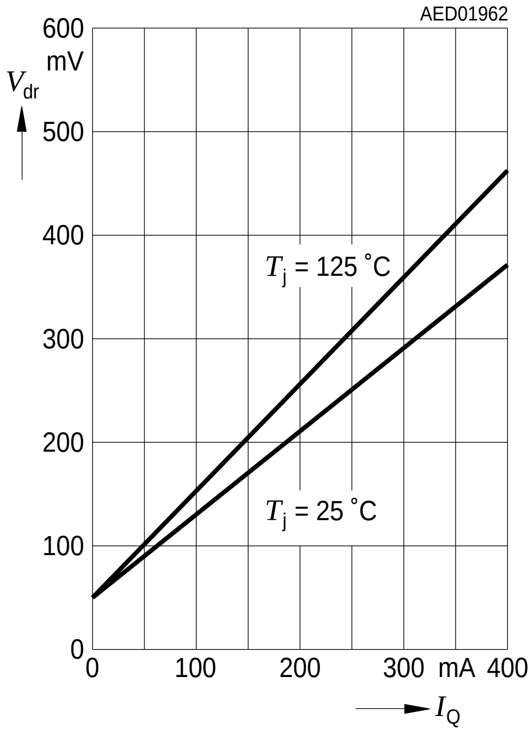


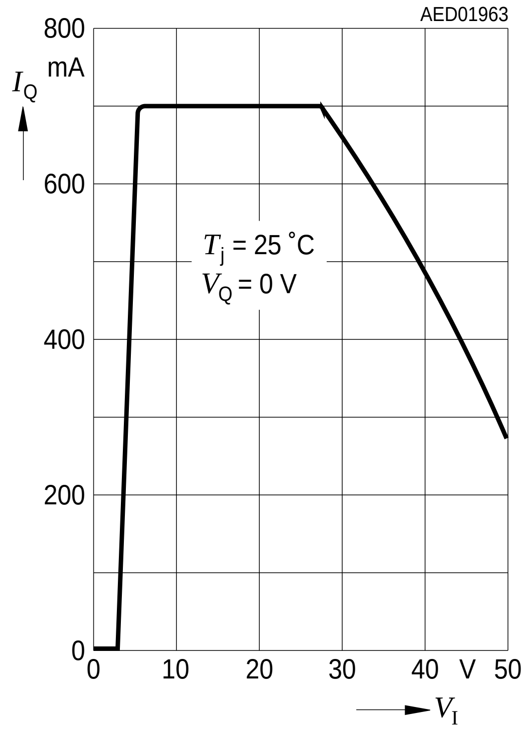
Figure 4 Application Circuit

Typical Performance Characteristics (V50, V85 and V10)

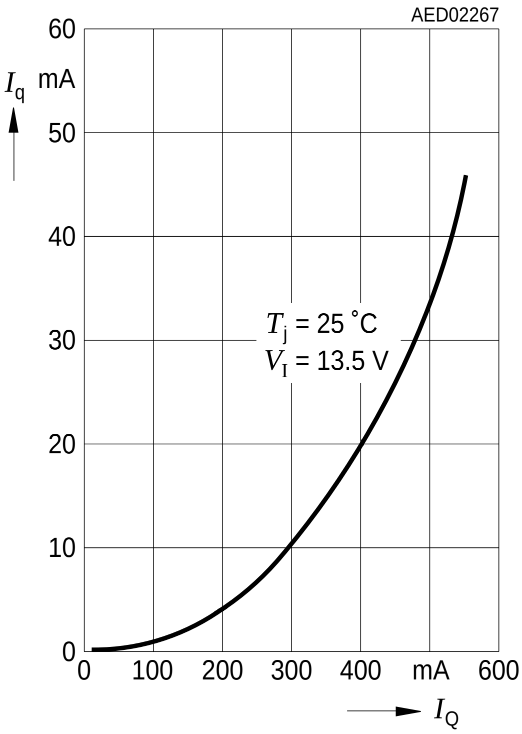
Drop Voltage V_{dr} versus Output Current I_Q



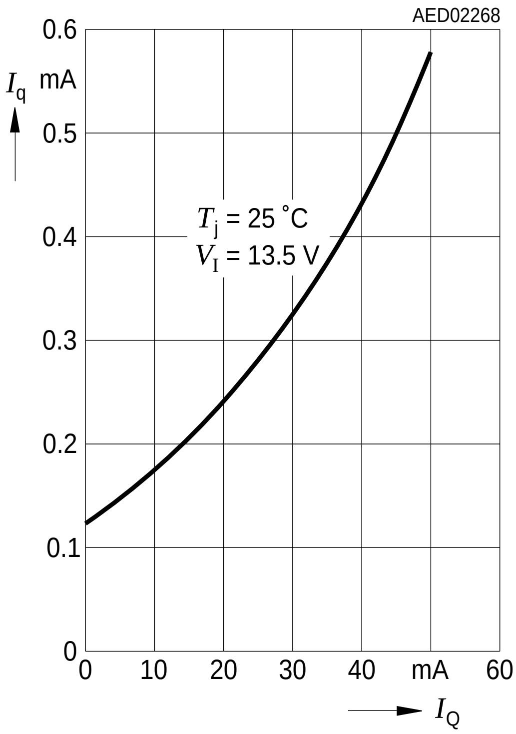
Output Current I_Q versus Input Voltage V_I



Current Consumption I_q versus Output Current I_Q (high load)

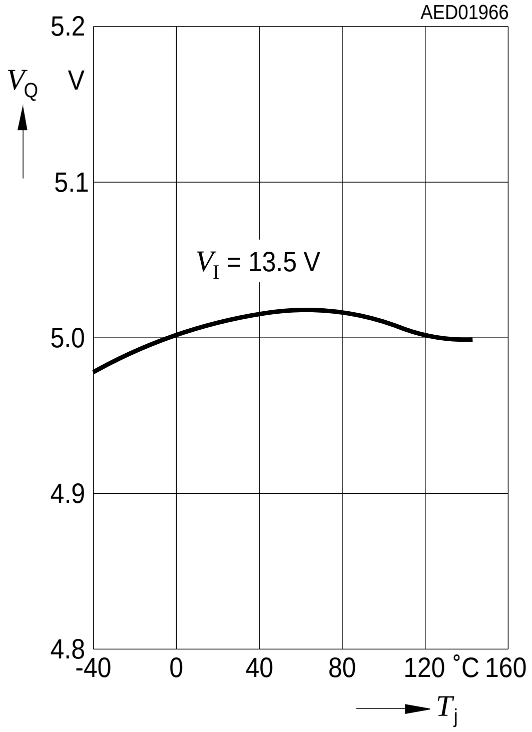


Current Consumption I_q versus Output Current I_Q (low load)

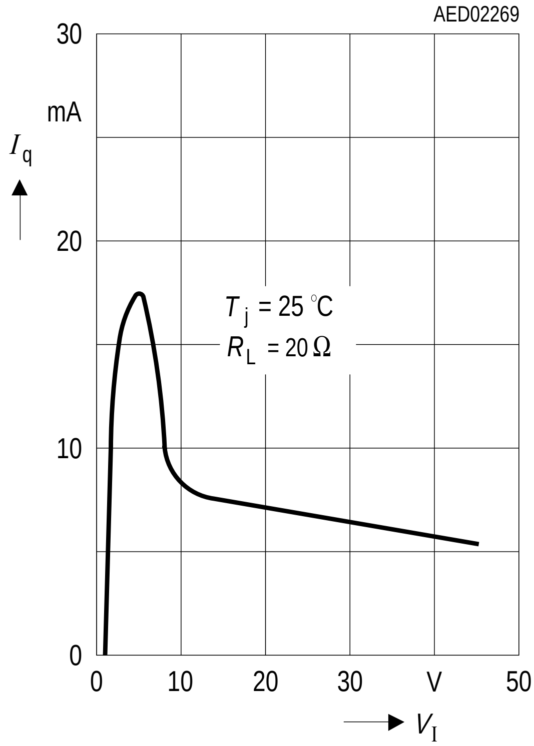


Typical Performance Characteristics (V50)

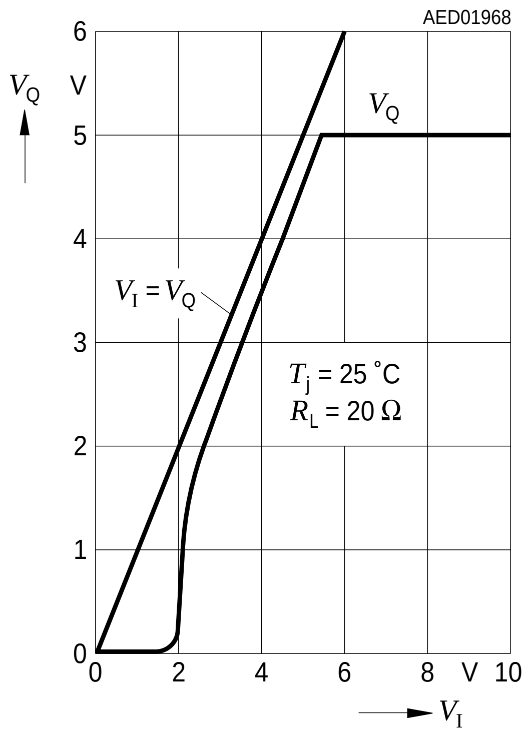
Output Voltage V_Q versus Junction Temperature T_j



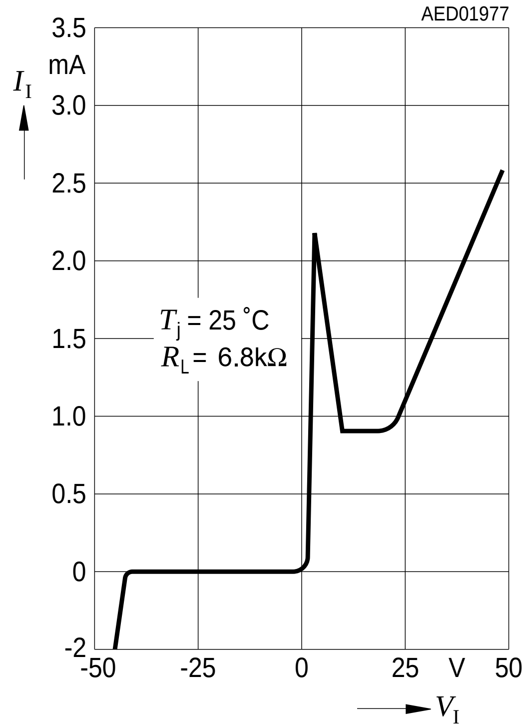
Current Consumption I_q versus Input Voltage V_I



Output Voltage V_Q versus Input Voltage V_I

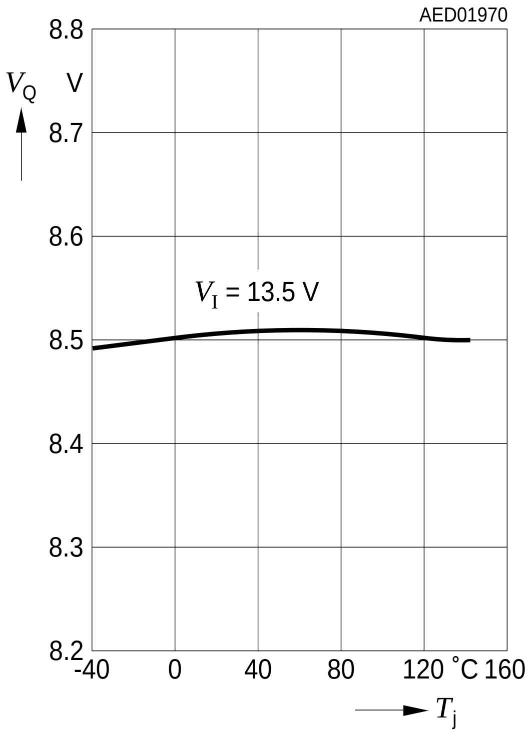


Input Current I_I versus Input Voltage V_I

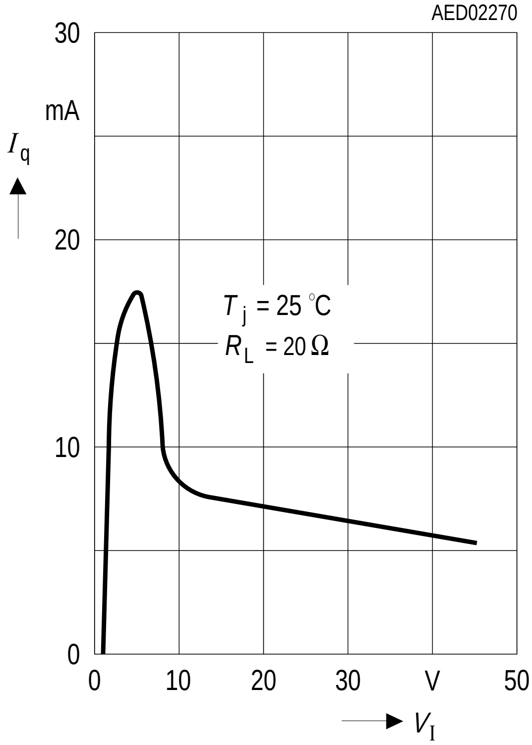


Typical Performance Characteristics for V85

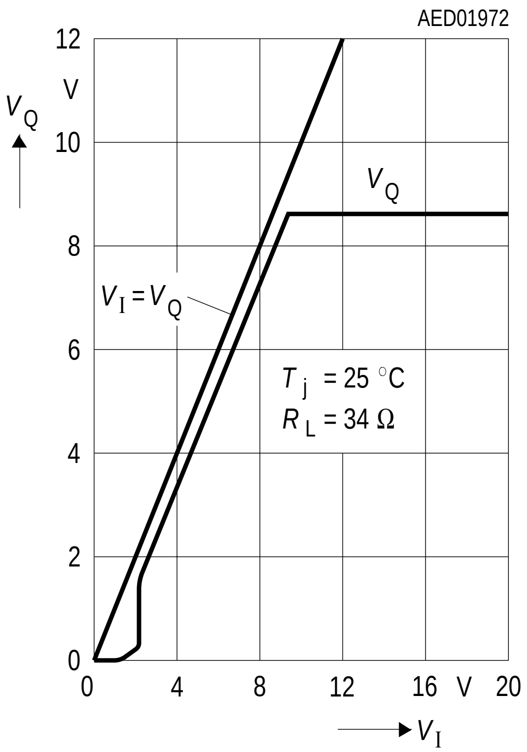
Output Voltage V_Q versus Junction Temperature T_j



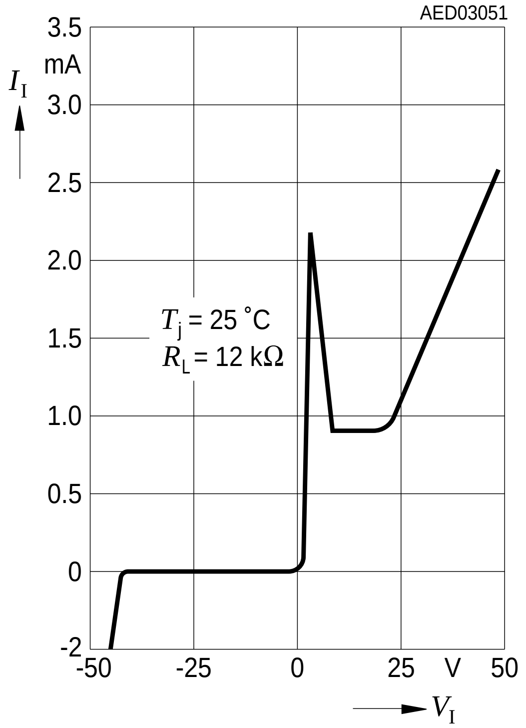
Current Consumption I_q versus Input Voltage V_I



Output Voltage V_Q versus Input Voltage V_I

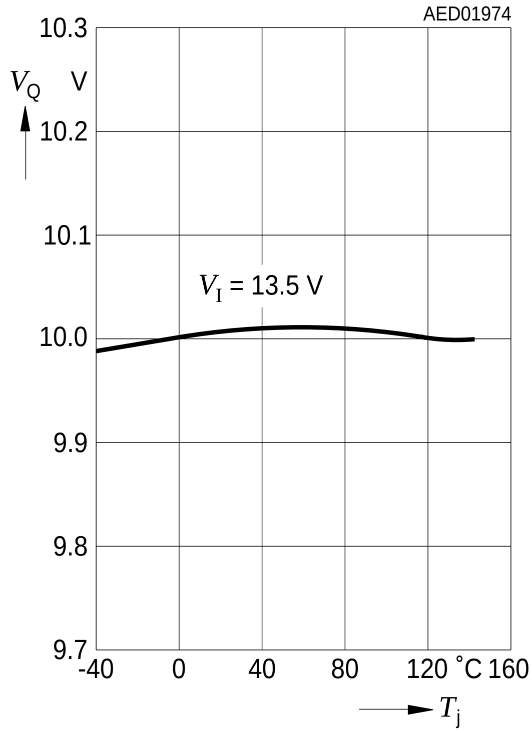


Input Current I_I versus Input Voltage V_I

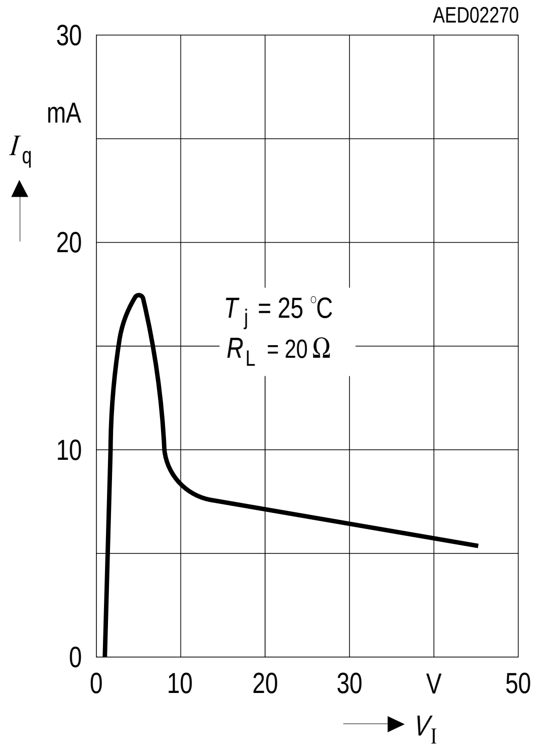


Typical Performance Characteristics for V10

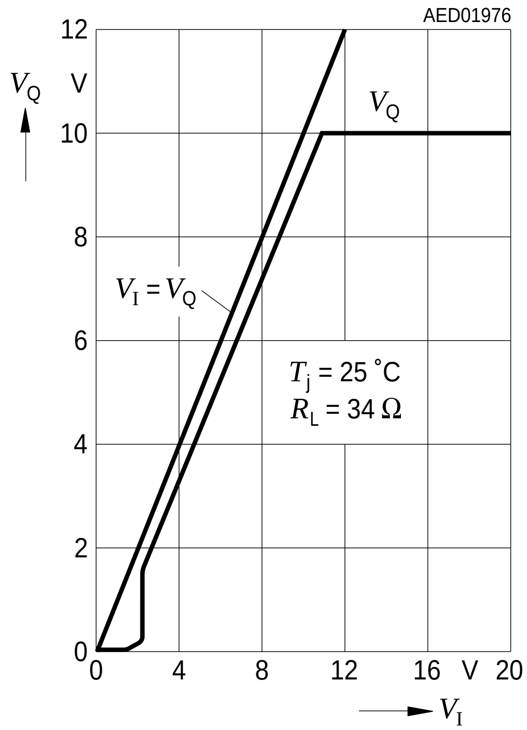
Output Voltage V_Q versus Junction Temperature T_j



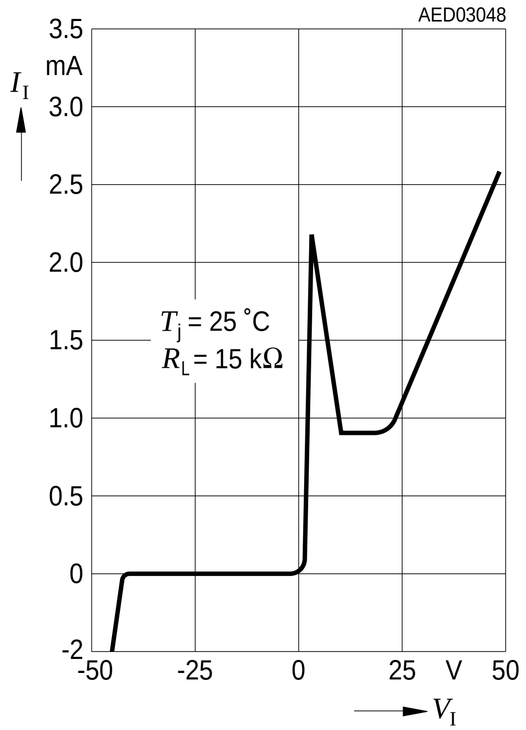
Current Consumption I_q versus Input Voltage V_I



Output Voltage V_Q versus Input Voltage V_I



Input Current I_I versus Input Voltage V_I



Package Outlines

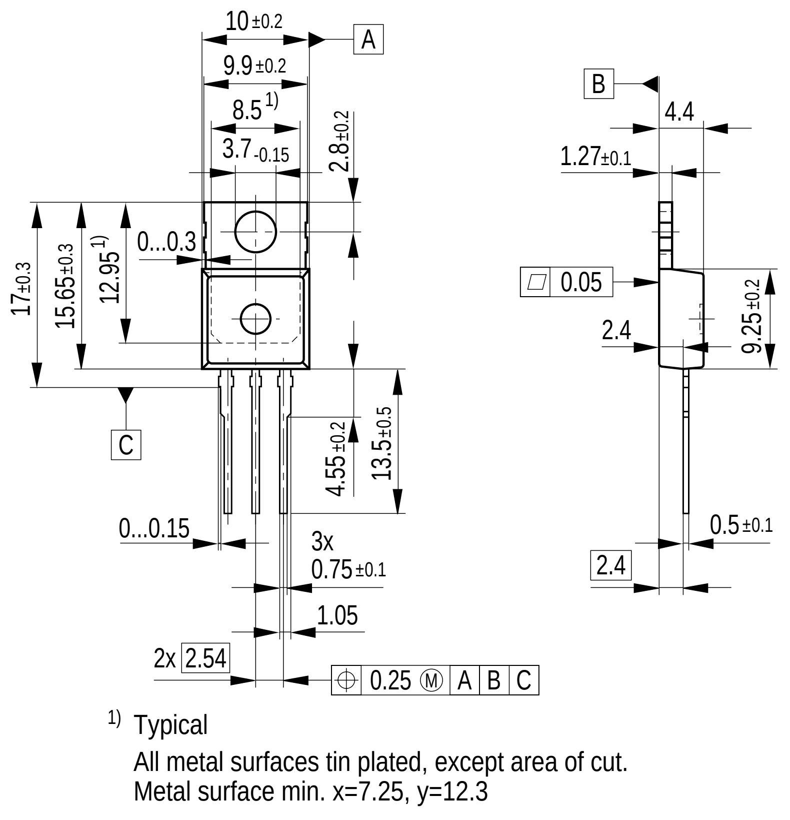


Figure 5 **PG-TO220-3-1** (Plastic Transistor Single Outline)

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

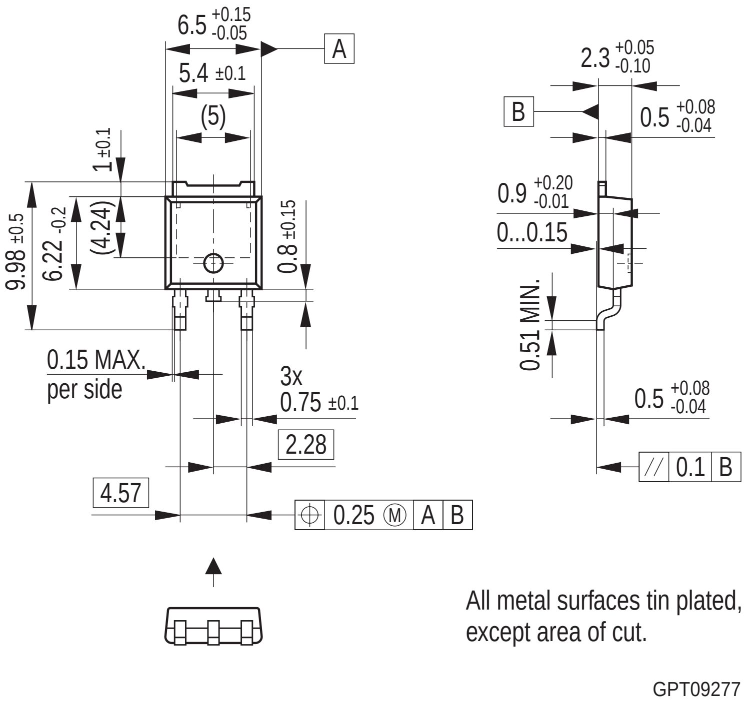

Figure 6 **PG-TO252-3-11** (Plastic Transistor Single Outline)

Green Product (RoHS-Compliant)

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Dimensions in mm

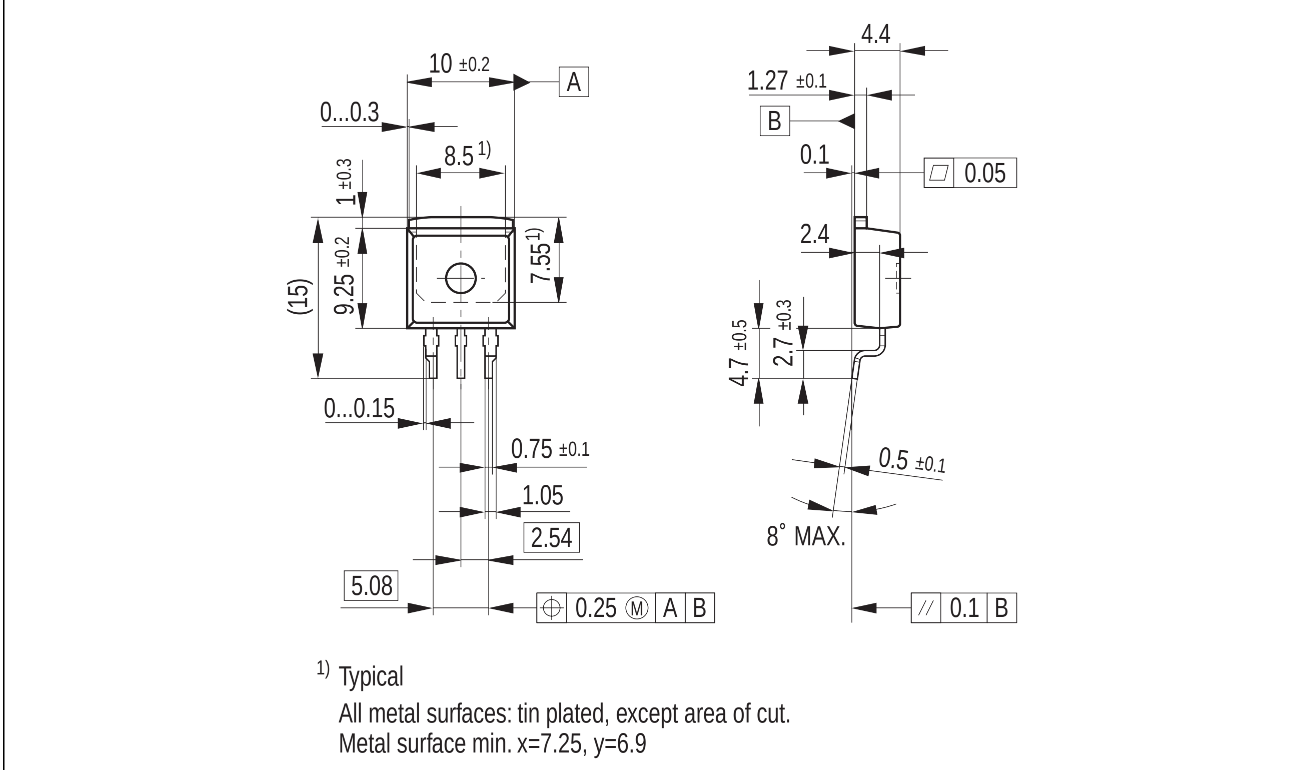

Figure 7 **PG-TO263-3-1** (Plastic Transistor Single Outline)

Green Product (RoHS-Compliant)

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SMD = Surface Mounted Device

Dimensions in mm

TLE 4274

Revision History:	**2007-01-23**	Rev. 1.6
Previous Version:	1.5	

Page	**Subjects (major changes since last revision)**
general	Updated Infineon logo
#1	Added “AEC” and “Green” logo
#1	Added “Green Product” and “AEC qualified” to the feature list
#1	Updated Package Names to “PG-xxx”
general	Removed leadframe variant “P-TO-252-1”
#12, #13, #14	Added “Green Product” remark
#16	Disclaimer Update

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