

# SIEMENS

## Low-Drop Voltage Regulator

TLE 4276

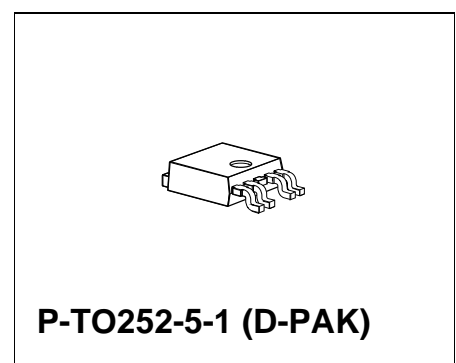
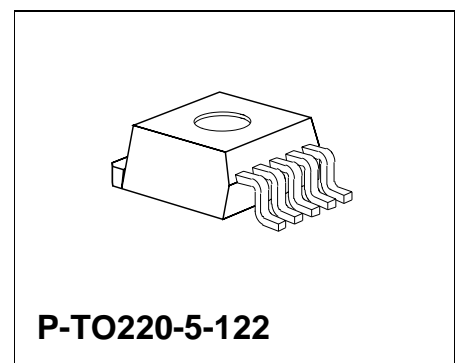
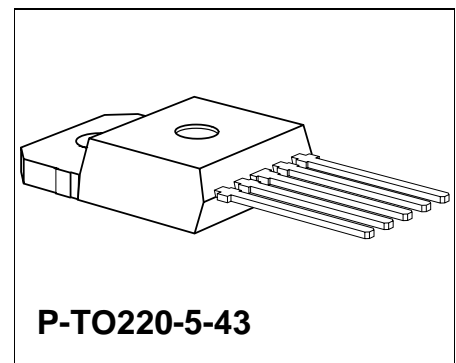
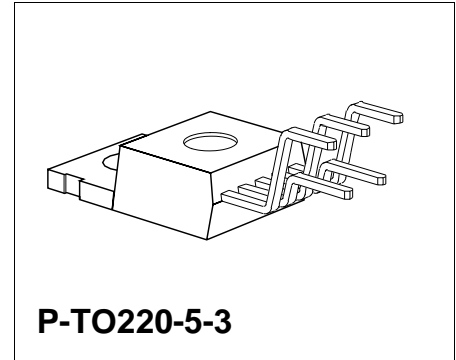
### Features

- Output voltage tolerance  $\leq \pm 4\%$
- Low-drop voltage
- Inhibit input
- Very low current consumption
- Short-circuit-proof
- Reverse polarity proof
- Suitable for use in automotive electronics

Type	Ordering Code	Package
TLE 4276 V50	Q67000-A9262	P-TO220-5-3
TLE 4276 V85	Q67000-A9263	P-TO220-5-3
TLE 4276 V10	Q67000-A9264	P-TO220-5-3
TLE 4276 G V50	Q67006-A9266	P-TO220-5-122
TLE 4276 G V85	Q67006-A9268	P-TO220-5-122
TLE 4276 G V10	Q67006-A9270	P-TO220-5-122
TLE 4276 S V50	Q67000-A9267	P-TO220-5-43
TLE 4276 S V85	Q67000-A9269	P-TO220-5-43
TLE 4276 S V10	Q67000-A9271	P-TO220-5-43
TLE 4276 V	Q67000-A9265	P-TO220-5-3
TLE 4276 SV	Q67000-A9273	P-TO220-5-43
TLE 4276 GV	Q67006-A9272	P-TO220-5-122
▼ TLE 4276 D V50	Q67006-A9358	P-TO252-5-1
▼ TLE 4276 DV	Q67006-A9361	P-TO252-5-1

■ SMD = Surface Mounted Device

▼ New type



### Functional Description

The TLE 4276 is a low-drop voltage regulator in a TO220 package. The IC regulates an input voltage up to 40 V to  $V_{Qrated} = 5.0\text{ V (V50)}$ , 8.5 V (V85), 10 V (V10) and adjustable voltage (V). The maximum output current is 400 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 short-circuit-proof and incorporates temperature protection that disables it at over-temperature.

### Dimensioning Information on External Components

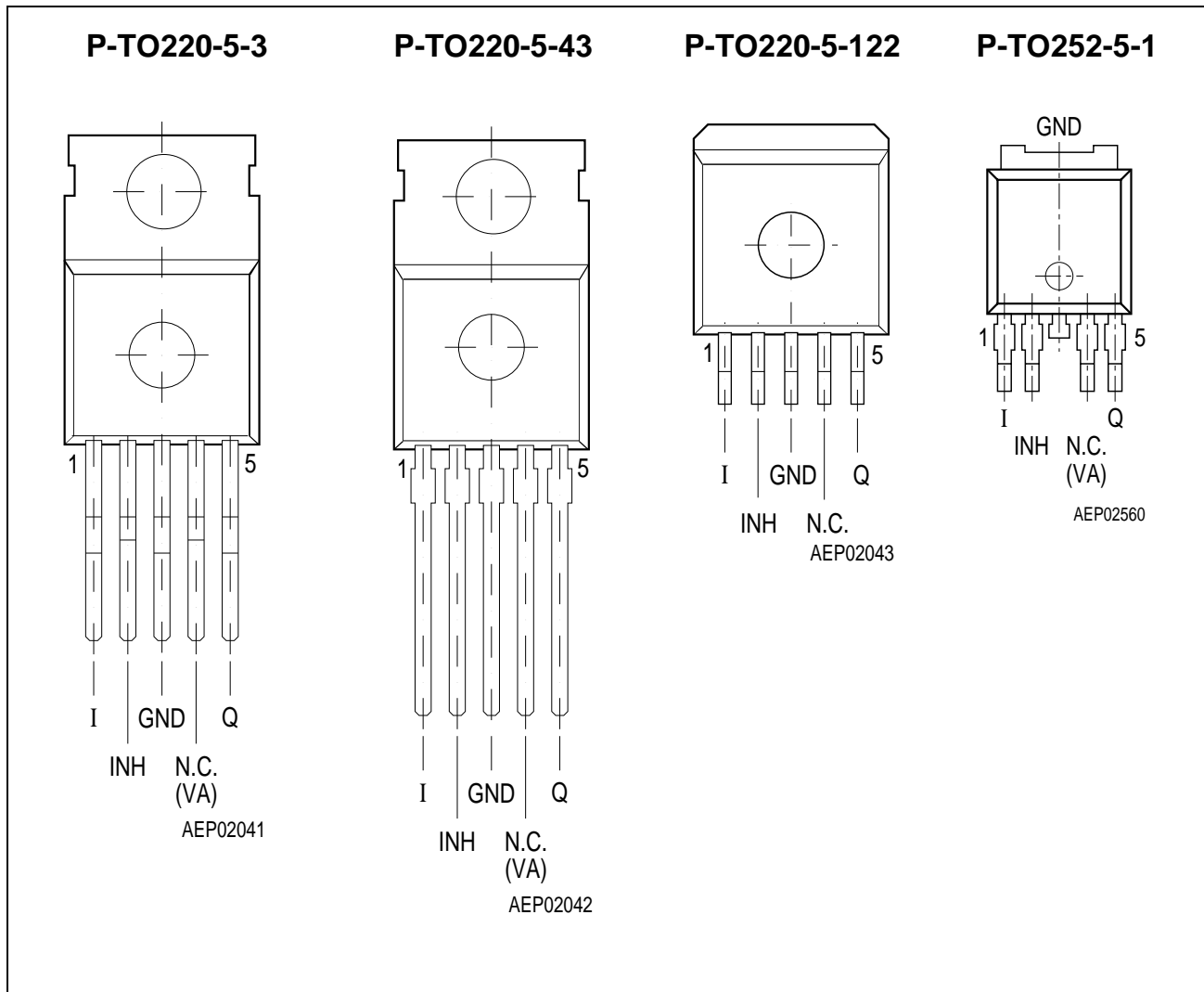
The input capacitor  $C_1$  is necessary for compensating line influences. Using a resistor of approx. 1  $\Omega$  in series with  $C_1$ , the oscillating of input inductivity and input capacitance can be damped. The output capacitor  $C_Q$  is necessary for the stability of the regulation circuit. Stability is guaranteed 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 incorporates a number of internal circuits for protection against:

- Overload
- Overtemperature
- Reverse polarity

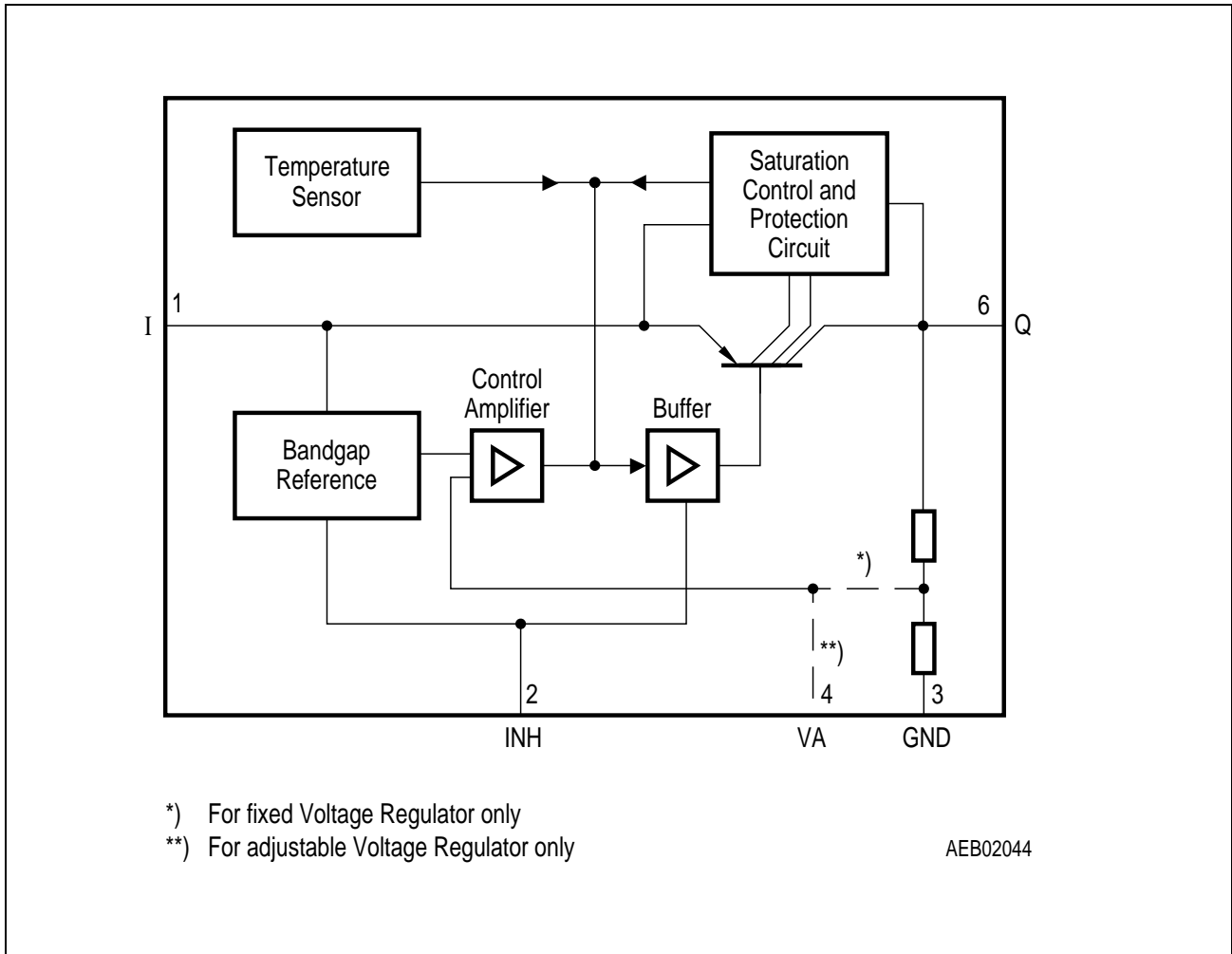
## Pin Configuration (top view)



**Figure 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	INH	<b>Inhibit</b> ; low-active input
3	GND	<b>Ground</b>
4	N.C. VA	<b>Not connected</b> for V50, V85, V10 <b>Voltage Adjust Input</b> ; only for adjustable output from external voltage divider.
5	Q	<b>Output</b> ; block to ground with a $\geq 22 \mu\text{F}$ capacitor.



**Figure 2**  
**Block Diagram**

## Absolute Maximum Ratings

$T_j = -40$  to  $150$  °C

Parameter	Symbol	Limit Values		Unit	Test Condition
		min.	max.		

### Voltage Regulator

#### Input

Voltage	$V_I$	- 42	45	V	-
Current	$I_I$	-	-	-	Internally limited

#### Inhibit

Voltage	$V_{INH}$	- 42	45	V	-
---------	-----------	------	----	---	---

### Voltage Adjust Input

Voltage	$V_{VA}$	- 0.3	10	V	-
---------	----------	-------	----	---	---

#### 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.*

## Operating Range

Parameter	Symbol	Limit Values		Unit	Remarks
		min.	max.		
Input voltage	$V_I$	$V_Q + 0.5$	40	V	–
Junction temperature	$T_j$	– 40	150	°C	–

## Thermal Resistance

Junction ambient	$R_{thja}$	–	65	K/W	TO220
Junction ambient	$R_{thja}$	–	70	K/W	TO252 <sup>1)</sup> , TO263
Junction case	$R_{thjc}$	–	4	K/W	–

<sup>1)</sup> Soldered in, minimal footprint

## Characteristics

$V_I = 13.5 \text{ V}$ ;  $-40 \text{ °C} < T_j < 150 \text{ °C}$  (unless otherwise specified)

Parameter	Symbol	Limit Values			Unit	Measuring Condition	Measuring Circuit
		min.	typ.	max.			
Output voltage	$V_Q$	4.8	5	5.2	V	V50-Version $5 \text{ mA} < I_Q < 400 \text{ mA}$ $6 \text{ V} < V_I < 40 \text{ V}$	1
Output voltage	$V_Q$	8.16	8.5	8.84	V	V85-Version $5 \text{ mA} < I_Q < 400 \text{ mA}$ $9.5 \text{ V} < V_I < 40 \text{ V}$	1
Output voltage	$V_Q$	9.6	10	10.4	V	V10-Version $5 \text{ mA} < I_Q < 400 \text{ mA}$ $11 \text{ V} < V_I < 40 \text{ V}$	1
Output voltage tolerance	$\Delta V_Q$	– 4		4	%	V-Version $V_{V.A.} = 2.5 \text{ V}$	1
Output current limitation <sup>1)</sup>	$I_Q$	400	600	–	mA	–	1
Current consumption; $I_q = I_I - I_Q$	$I_q$	–	0	10	μA	$V_{INH} = 0 \text{ V}$ ; $T_j \leq 100 \text{ °C}$	1
Current consumption; $I_q = I_I - I_Q$	$I_q$	–	100	220	μA	$I_Q = 1 \text{ mA}$	1

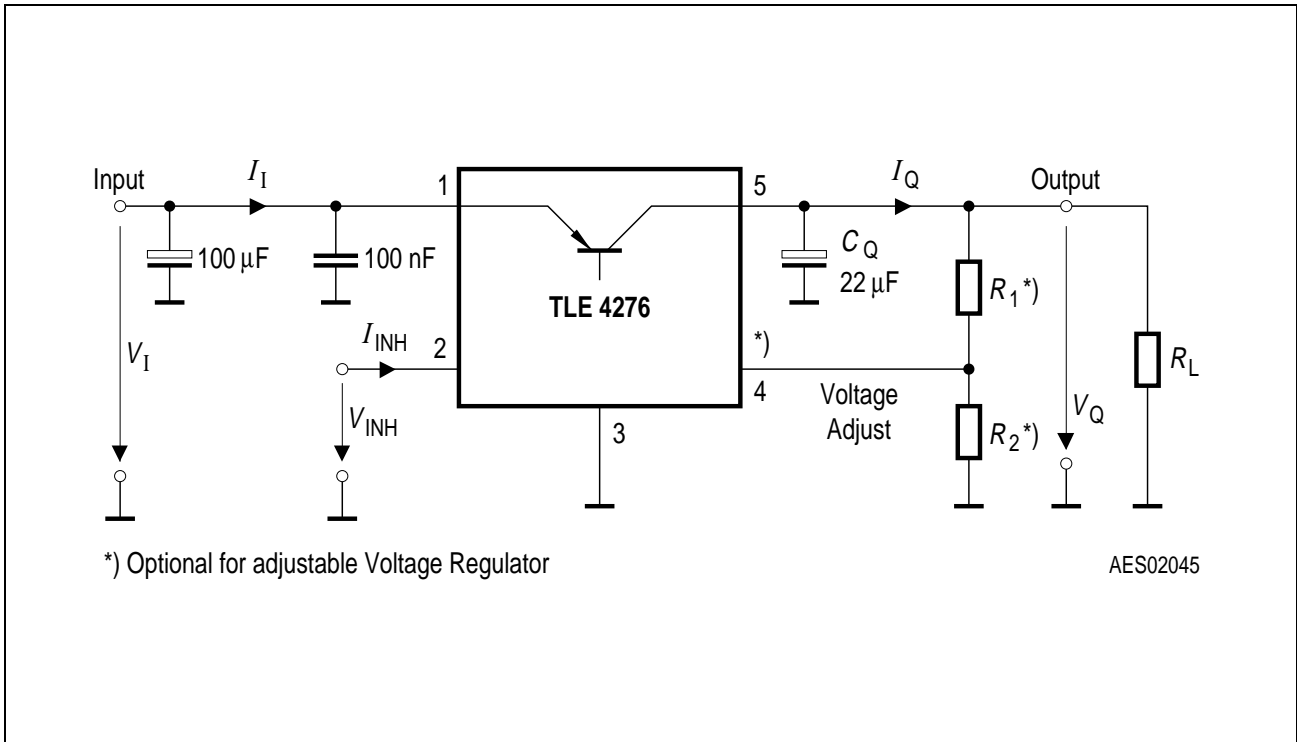
**Characteristics (cont'd)**
 $V_I = 13.5 \text{ V}; -40 \text{ }^\circ\text{C} < T_j < 150 \text{ }^\circ\text{C}$  (unless otherwise specified)

Parameter	Symbol	Limit Values			Unit	Measuring Condition	Measuring Circuit
		min.	typ.	max.			
Current consumption; $I_q = I_I - I_Q$	$I_q$	–	5	10	mA	$I_Q = 250 \text{ mA}$	1
	$I_q$		15	25	mA	$I_Q = 400 \text{ mA}$	1
Drop voltage <sup>1)</sup>	$V_{DR}$	–	250	500	mV	$I_Q = 250 \text{ mA}$ $V_{DR} = V_I - V_Q$	1
Load regulation	$\Delta V_Q$	–	5	35	mV	$I_Q = 5 \text{ mA to } 400 \text{ mA}$	1
Line regulation	$\Delta V_Q$	–	10	25	mV	$\Delta V_I = 12 \text{ V to } 32\text{V}$ $I_Q = 5 \text{ mA}$	1
Power supply ripple rejection	$PSRR$	–	60	–	dB	$f_r = 100 \text{ Hz};$ $V_r = 0.5 V_{SS}$	1
Temperature output voltage drift	$\frac{dV_Q}{dT}$	–	0.5	–	–	–	mV/K

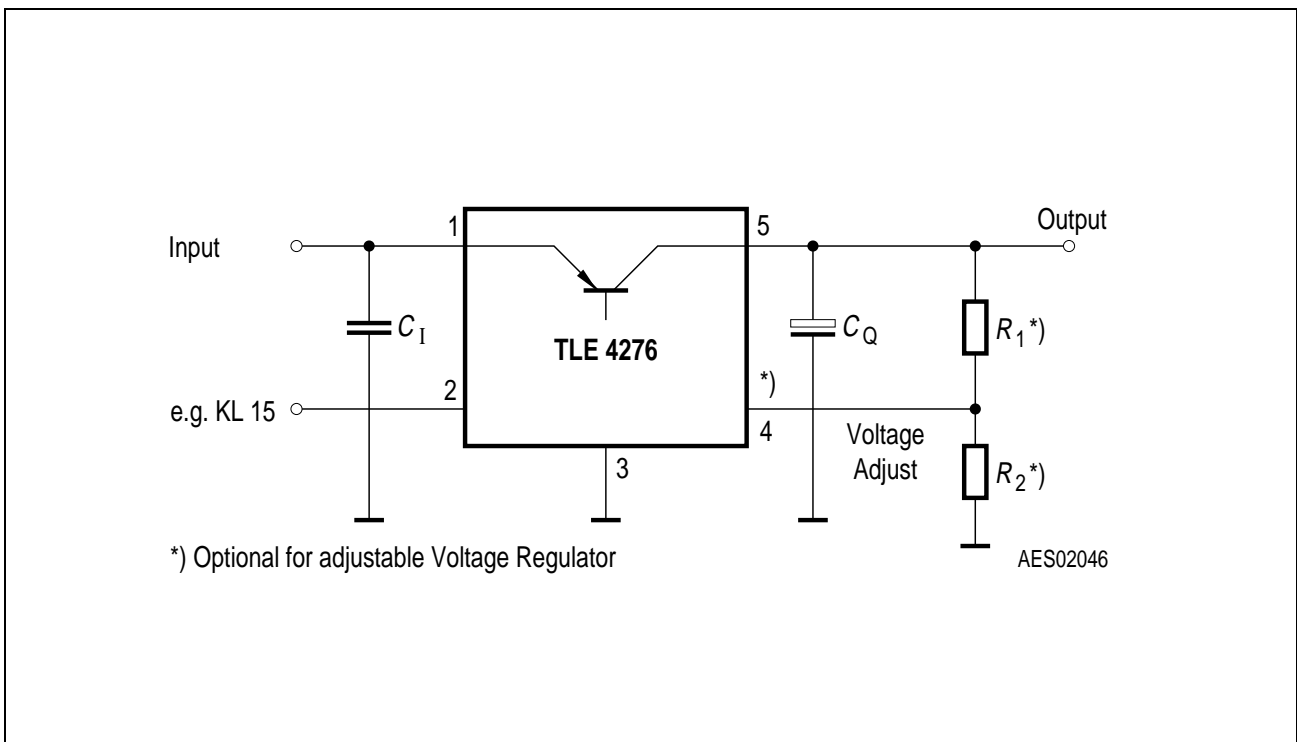
<sup>1)</sup> Measured when the output voltage  $V_Q$  has dropped 100 mV from the nominal value obtained at  $V_I = 13.5 \text{ V}$ .

**Inhibit**

Inhibit on voltage	$V_{INH}$	–	2	3.5	V	$V_Q \geq 4.9 \text{ V}$	1
Inhibit off voltage	$V_{INH}$	0.5	1.7	–	V	$V_Q \leq 0.1 \text{ V}$	1
Input current	$I_{INH}$	5	10	20	$\mu\text{A}$	$V_{INH} = 5 \text{ V}$	1



**Figure 3**  
**Measuring Circuit**

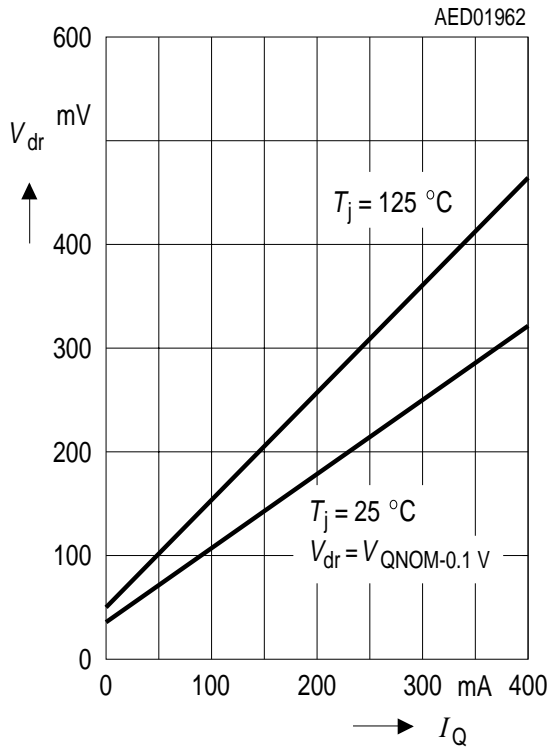


**Figure 4**  
**Application Circuit**

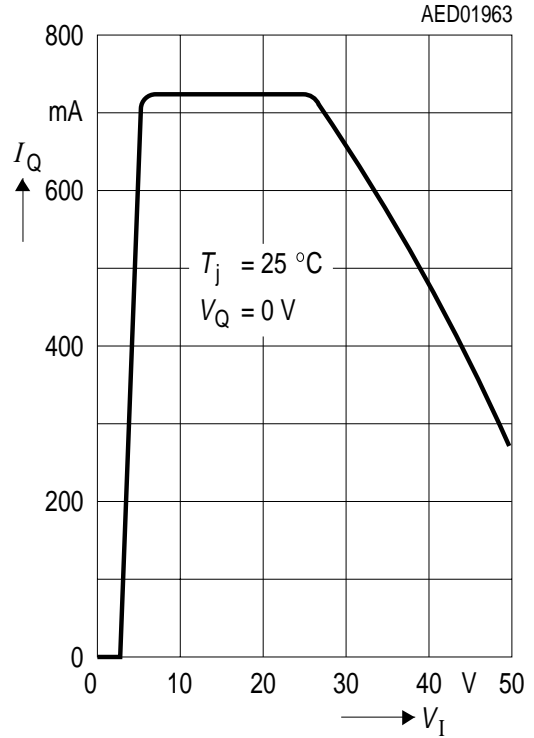


Typical Performance Characteristics (V50, V85 and V10):

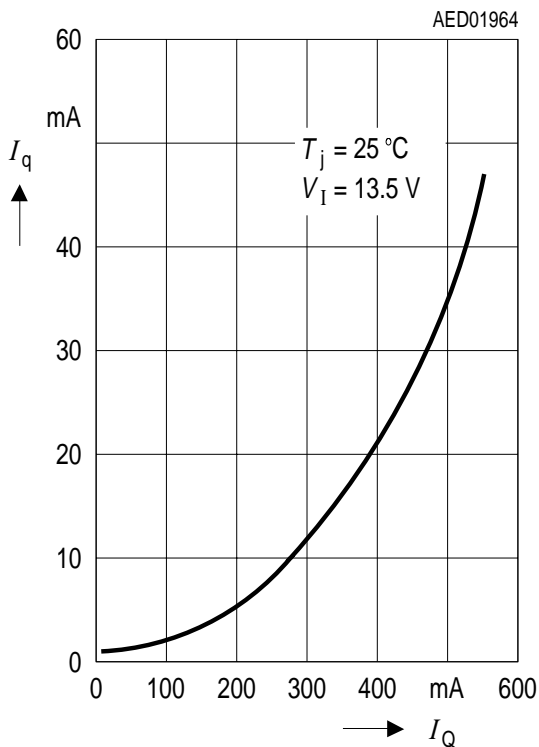
Drop Voltage  $V_{DR}$  versus Output Current  $I_Q$



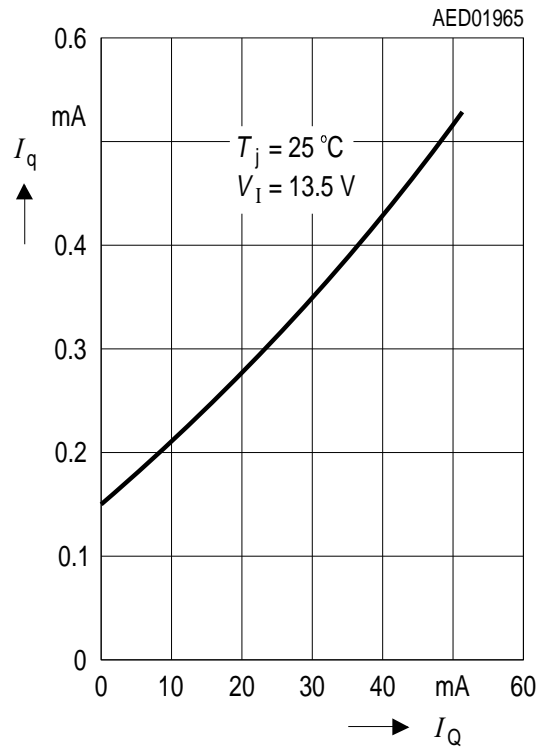
Max. Output Current  $I_Q$  versus Input Voltage  $V_I$



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

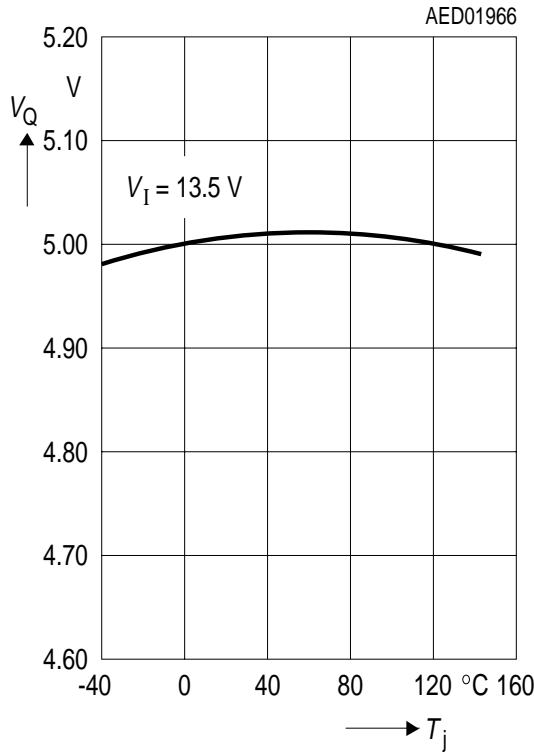


Current Consumption  $I_q$  versus Output Current  $I_Q$  (low load)

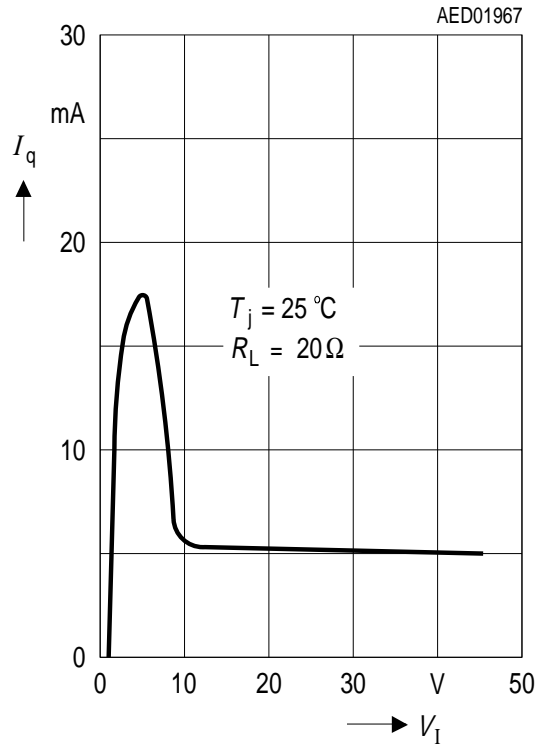


Typical Performance Characteristics for V50:

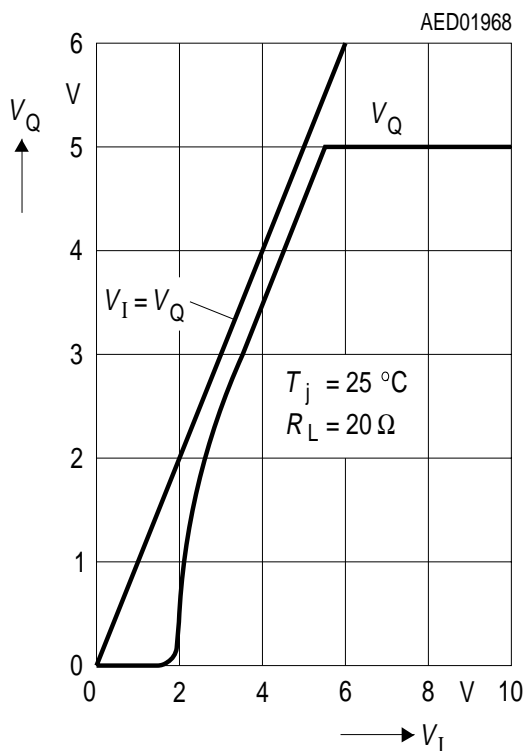
Output Voltage  $V_Q$  versus Temperature  $T_j$



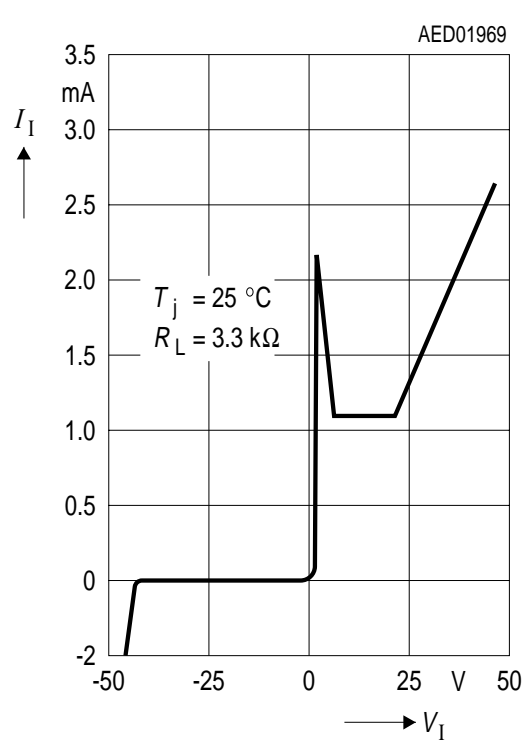
Current Consumption  $I_q$  versus Input Voltage  $V_I$



Low Voltage Behavior

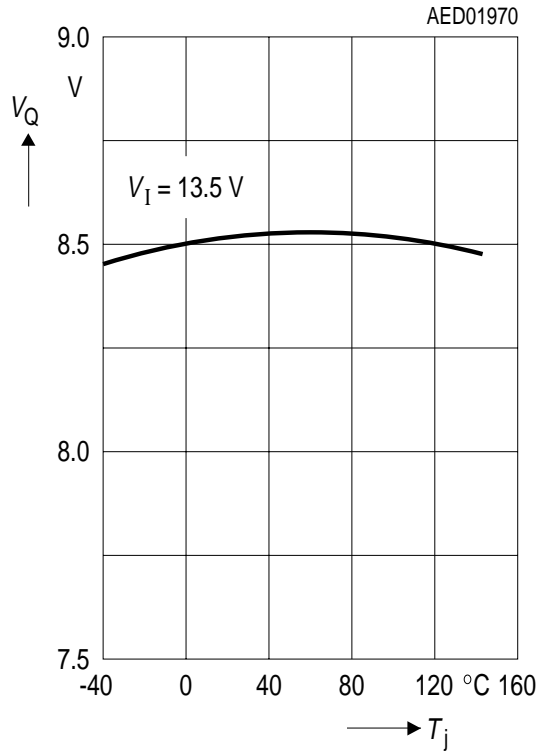


High Voltage Behavior

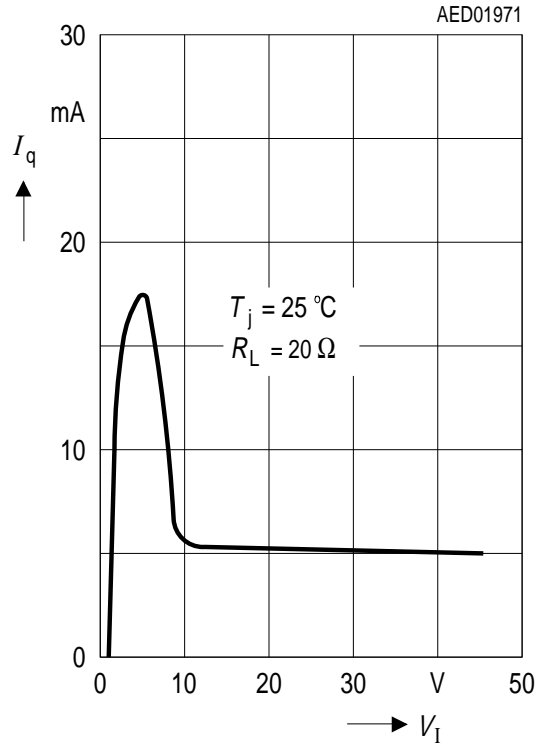


Typical Performance Characteristics for V85:

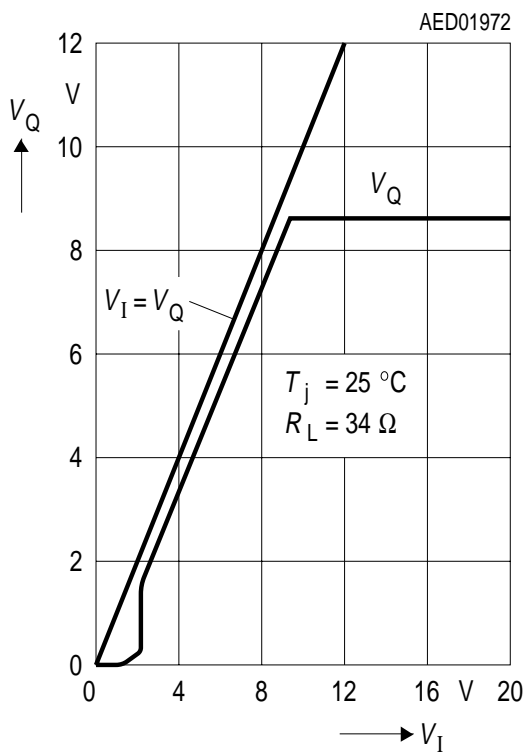
Output Voltage  $V_Q$  versus Temperature  $T_j$



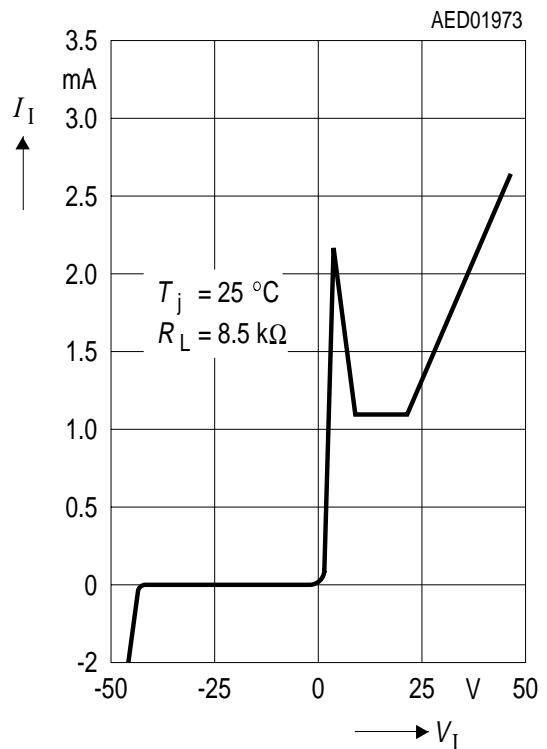
Current Consumption  $I_q$  versus Input Voltage  $V_I$



Low Voltage Behavior

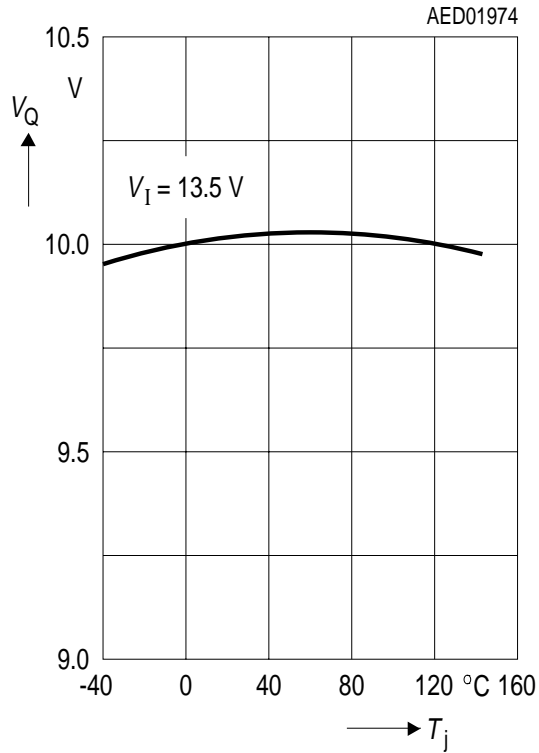


High Voltage Behavior

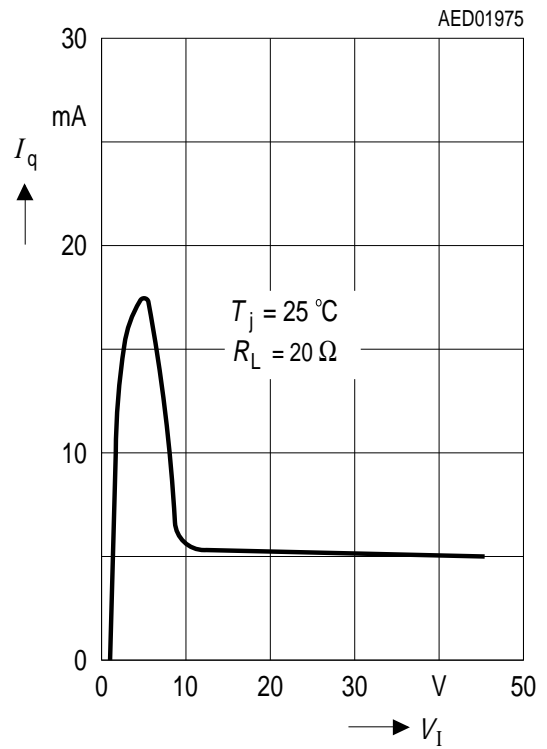


Typical Performance Characteristics for V10:

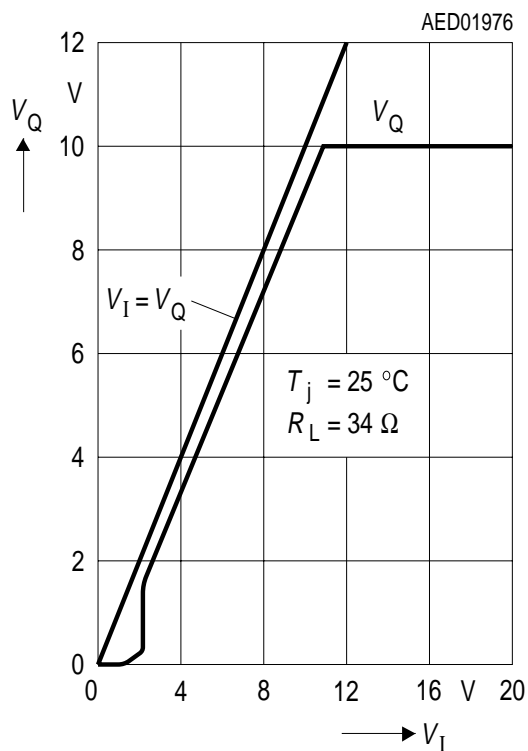
Output Voltage  $V_Q$  versus Temperature  $T_j$



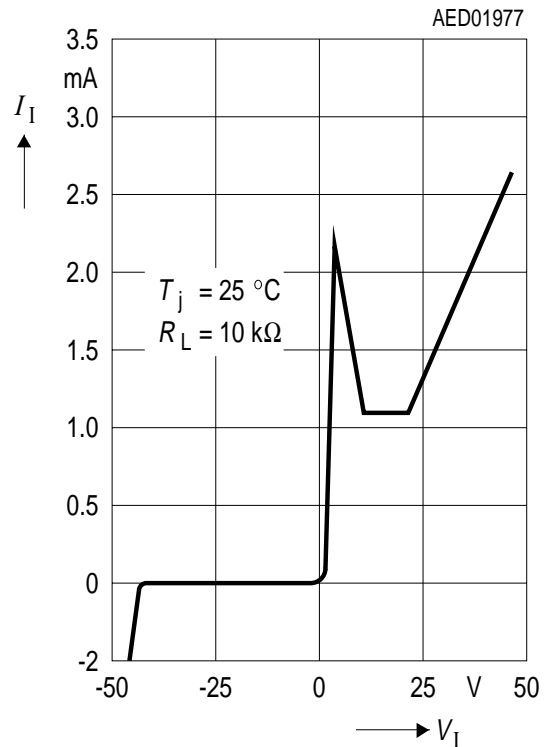
Current Consumption  $I_q$  versus Input Voltage  $V_I$



Low Voltage Behavior



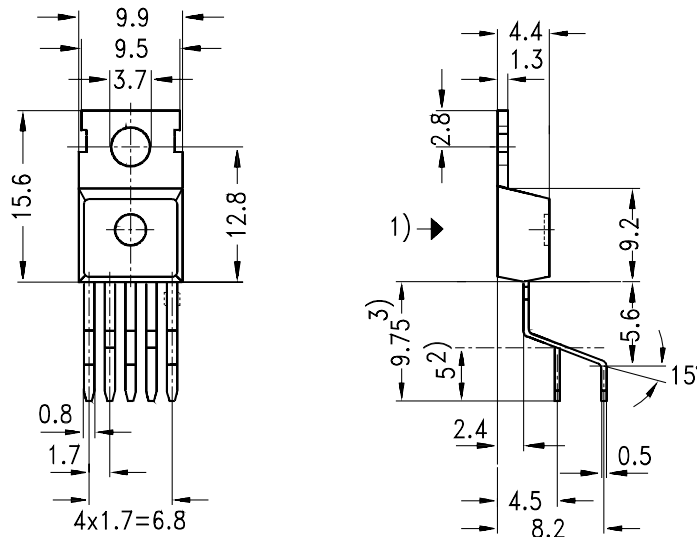
High Voltage Behavior



Package Outlines

**P-TO220-5-3**

(Plastic Transistor Single Outline)



GPT05165

- 1) shear and punch direction no burrs this surface
- 2) min. length by finning
- 3) max. 11 mm allowable by finning

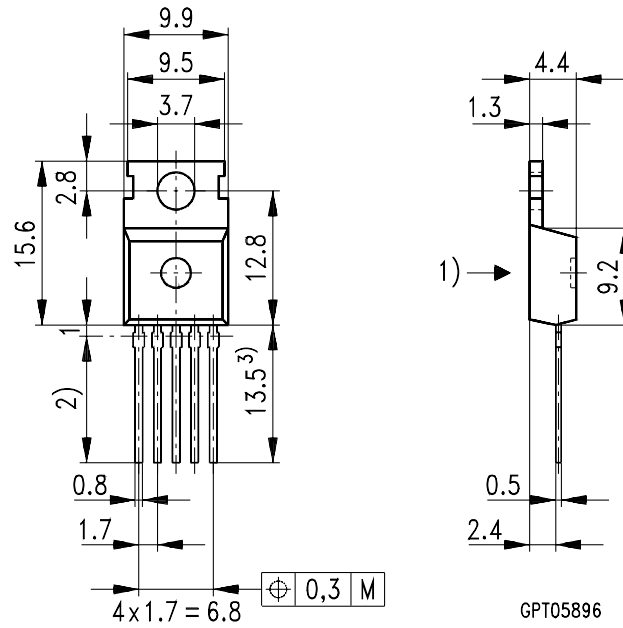
**Sorts of Packing**

Package outlines for tubes, trays etc. are contained in our Data Book "Package Information"

Dimensions in mm

**P-TO220-5-43**

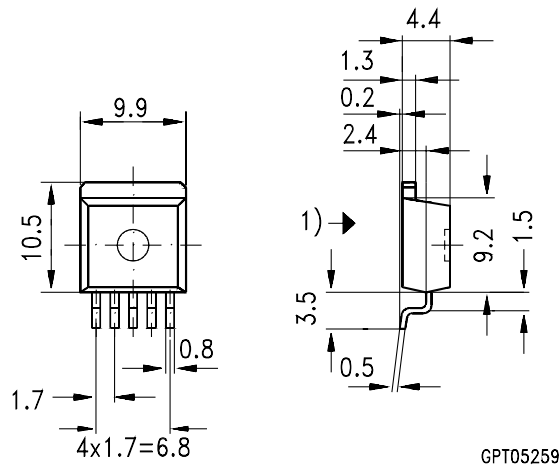
(Plastic Transistor Single Outline)



- 1) Punch direction, burr max. 0.04
- 2) Dip finning
- 3) Max. 14.5 by dip finning press burr  
max. 0.05 radii not dimensioned max. 0.2

**P-TO220-5-122**

(Plastic Transistor Single Outline)



GPT05259

1) shear and punch direction no burrs this surface

**Sorts of Packing**

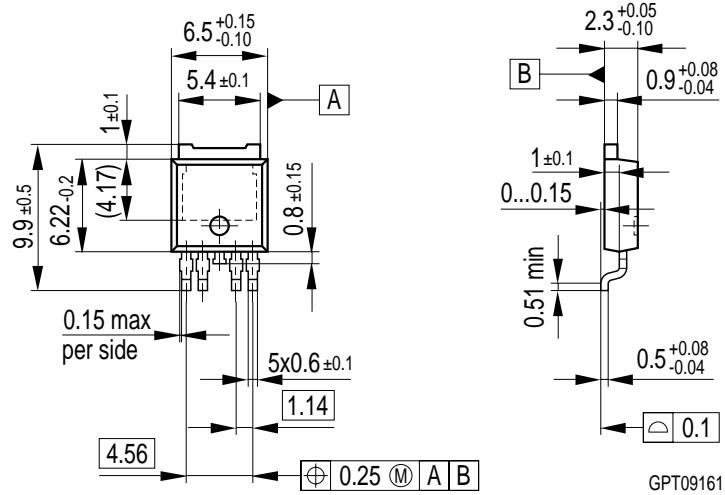
Package outlines for tubes, trays etc. are contained in our Data Book "Package Information".

SMD = Surface Mounted Device

Dimensions in mm

**P-TO252-5-1**

(Plastic Transistor Single Outline)



All metal surfaces tin plated, except area of cut.

**Sorts of Packing**

Package outlines for tubes, trays etc. are contained in our Data Book "Package Information".

SMD = Surface Mounted Device

Dimensions in mm