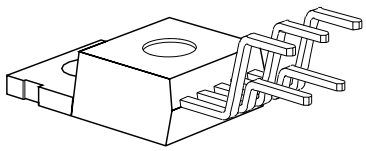
SIEMENS

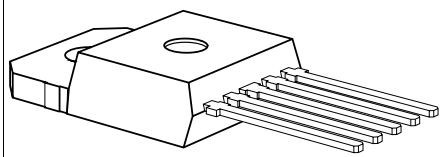
Low-Drop Voltage Regulator — TLE 4276

Features

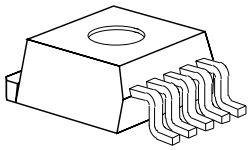
- Output voltage tolerance ≤ ± 4%
- Low-drop voltage
- Inhibit input
- Very low current consumption
- Short-circuit-proof
- Reverse polarity proof
- Suitable for use in automotive electronics



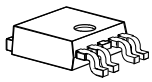
P-TO220-5-3



P-TO220-5-43



P-TO220-5-122



P-TO252-5-1 (D-PAK)

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 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 µA. 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_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 incorporates a number of internal circuits for protection against:

- Overload
- Overtemperature
- Reverse polarity

Pin Configuration
(top view)

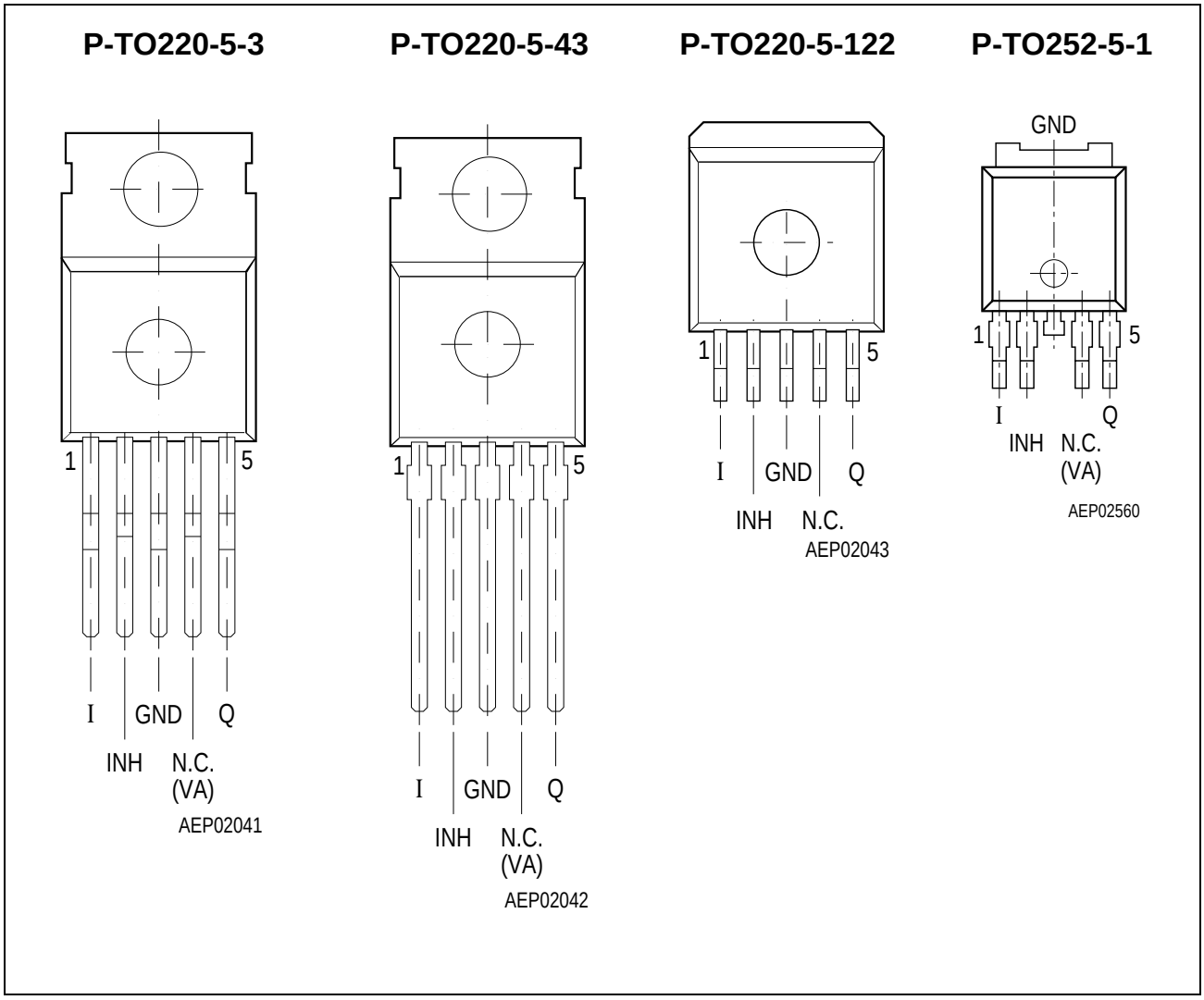


Figure 1

Pin Definitions and Functions

Pin No.	Symbol	Function
1	I	**Input**; block to ground directly at the IC with a ceramic capacitor.
2	INH	**Inhibit**; low-active input
3	GND	**Ground**
4	N.C. VA	**Not connected** for V50, V85, V10 **Voltage Adjust Input**; only for adjustable output from external voltage divider.
5	Q	**Output**; block to ground with a ≥ 22 µF capacitor.

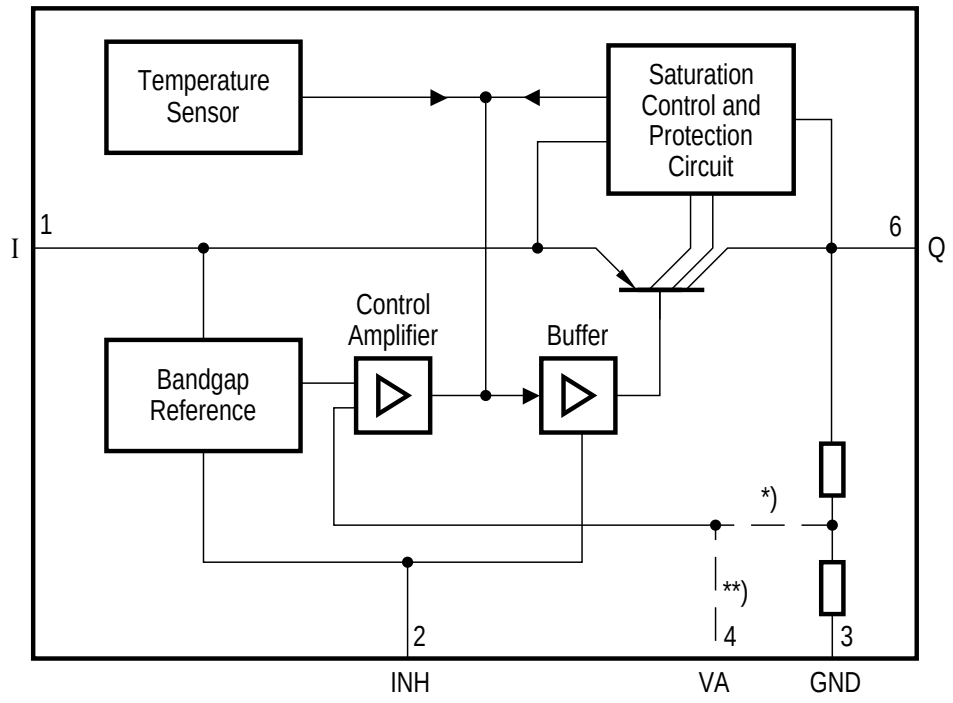


Figure 2
Block Diagram

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[1)], TO263
Junction case	R_{thjc}	–	4	K/W	–

[1)] Soldered in, minimal footprint

Characteristics

V_I = 13.5 V; – 40 °C < T_j < 150 °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 mA < I_Q < 400 mA 6 V < V_I < 40 V	1
Output voltage	V_Q	8.16	8.5	8.84	V	V85-Version 5 mA < I_Q < 400 mA 9.5 V < V_I < 40 V	1
Output voltage	V_Q	9.6	10	10.4	V	V10-Version 5 mA < I_Q < 400 mA 11 V < V_I < 40 V	1
Output voltage tolerance	ΔV_Q	– 4		4	%	V-Version $V_{V.A.}$= 2.5 V	1
Output current limitation[1)]	I_Q	400	600	–	mA	–	1
Current consumption; $I_q = I_I - I_Q$	I_q	–	0	10	µA	V_{INH} = 0 V; $T_j \leq$ 100 °C	1
Current consumption; $I_q = I_I - I_Q$	I_q	–	100	220	µA	I_Q = 1 mA	1

Characteristics (cont'd)
V_I = 13.5 V; – 40 °C < T_j < 150 °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 mA	1
	I_q		15	25	mA	I_Q = 400 mA	1
Drop voltage[1]	V_{DR}	–	250	500	mV	I_Q = 250 mA $V_{DR} = V_I - V_Q$	1
Load regulation	ΔV_Q	–	5	35	mV	I_Q = 5 mA to 400 mA	1
Line regulation	ΔV_Q	–	10	25	mV	ΔV_I = 12 V to 32V I_Q = 5 mA	1
Power supply ripple rejection	$PSRR$	–	60	–	dB	f_r = 100 Hz; V_r = 0.5 V_{SS}	1
Temperature output voltage drift	$\frac{dV_Q}{dT}$	–	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.

Inhibit

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

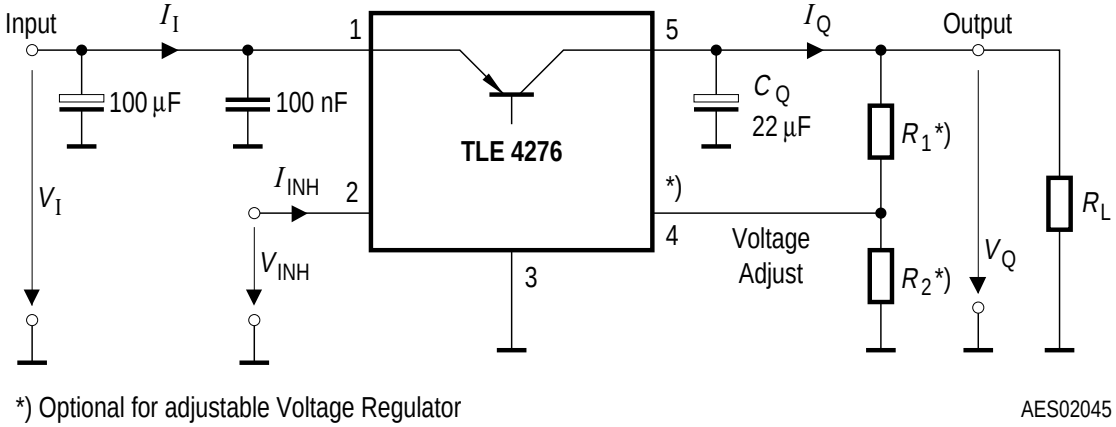


Figure 3
Measuring Circuit

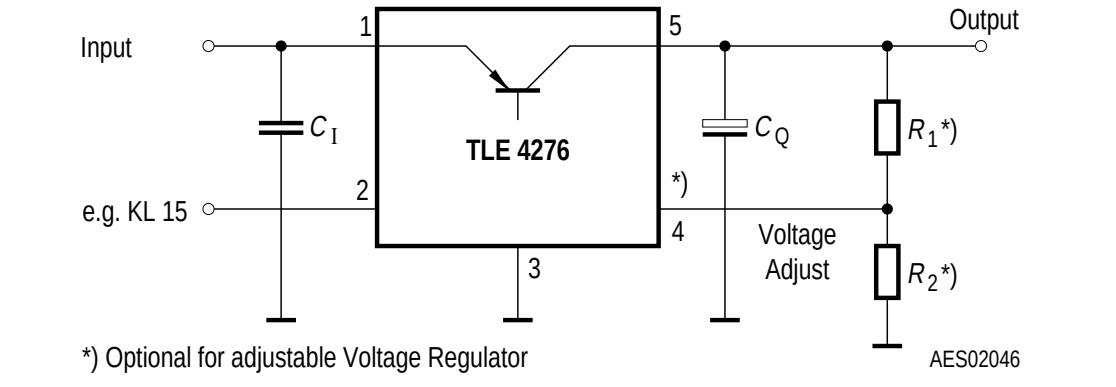
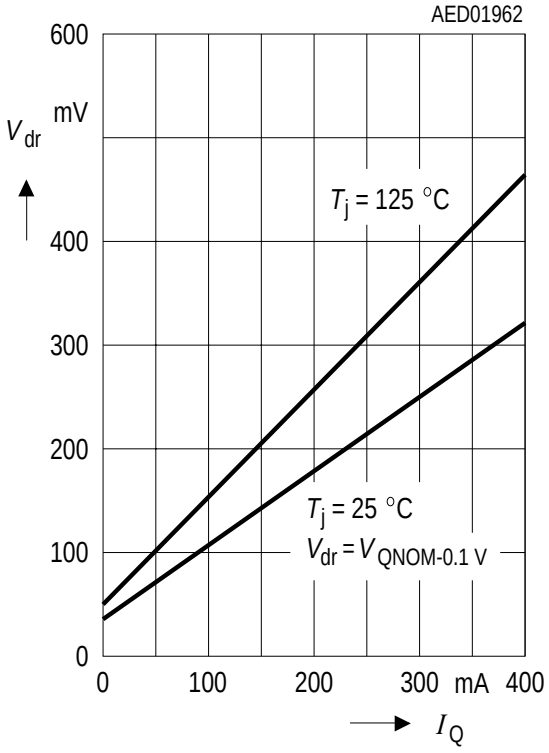


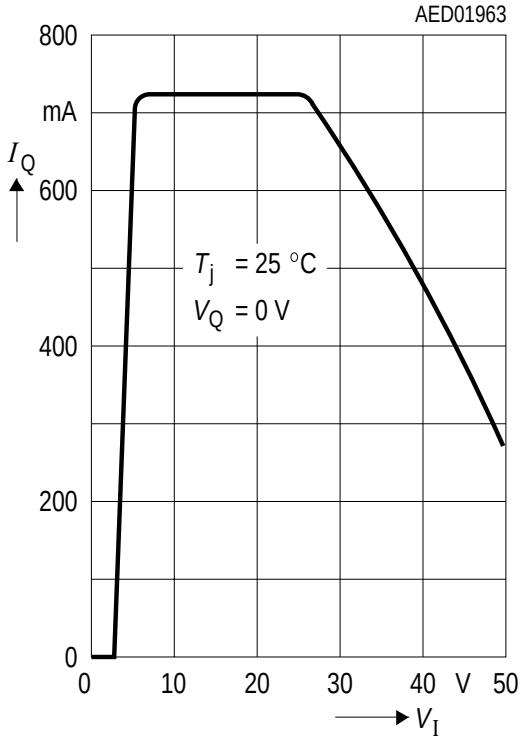
Figure 4
Application Circuit

Typical Performance Characteristics (V50, V85 and V10):

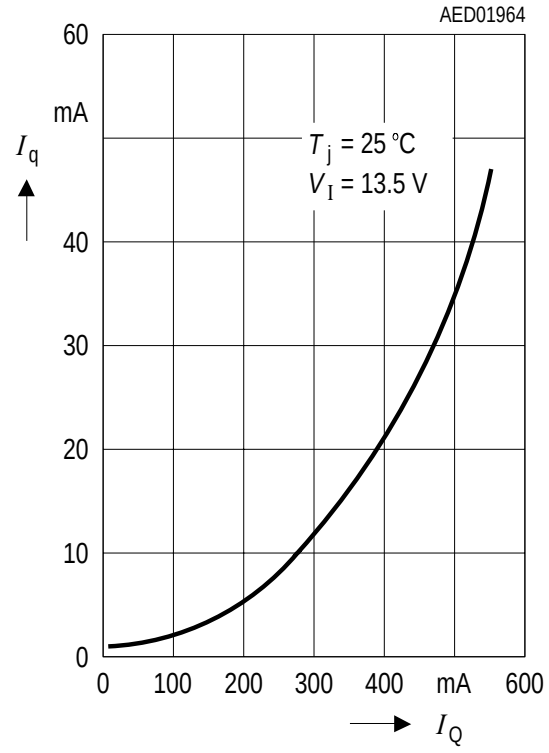
Drop Voltage V_{DR} versus Output Current I_Q



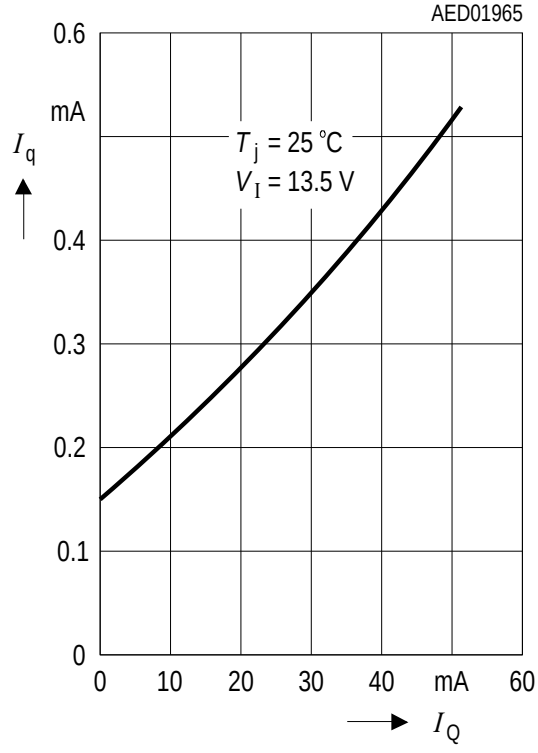
Max. Output Current I_Q versus Input Voltage V_I



Current Consumption I_q versus Output Current I_Q (high load)

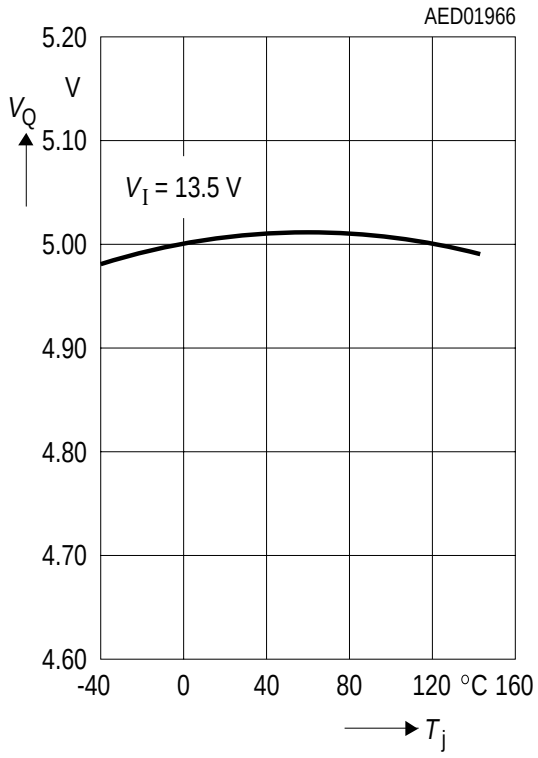


Current Consumption I_q versus Output Current I_Q (low load)

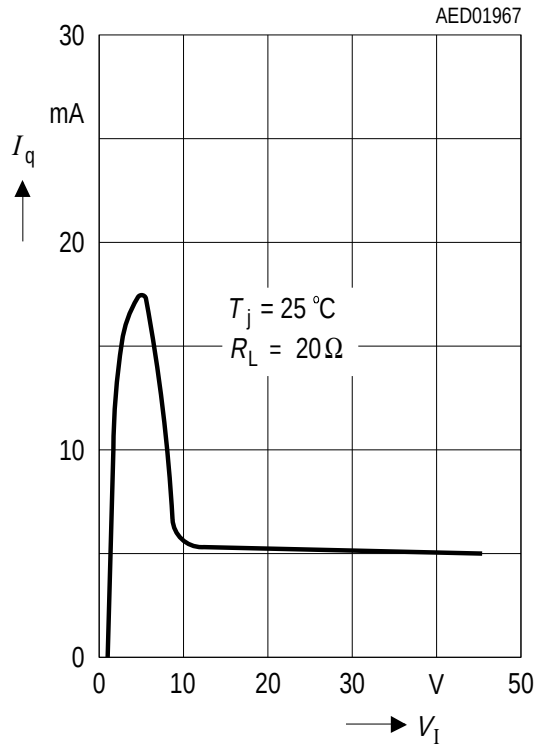


Typical Performance Characteristics for V50:

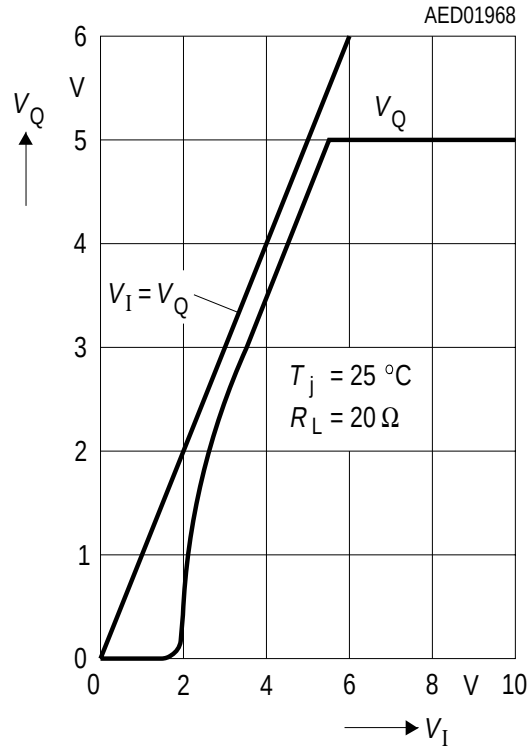
Output Voltage V_Q versus Temperature T_j



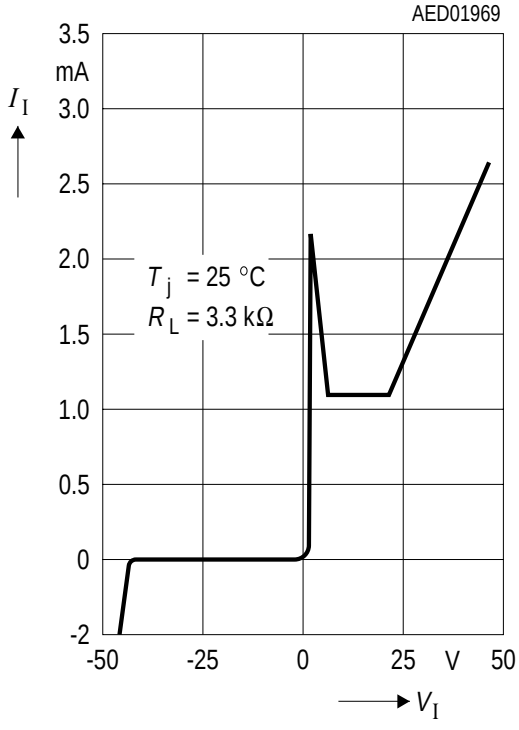
Current Consumption I_q versus Input Voltage V_I



Low Voltage Behavior

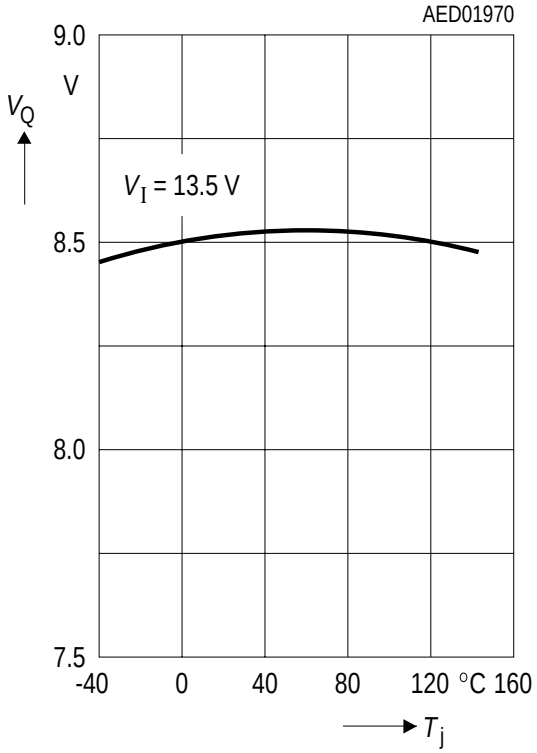


High Voltage Behavior

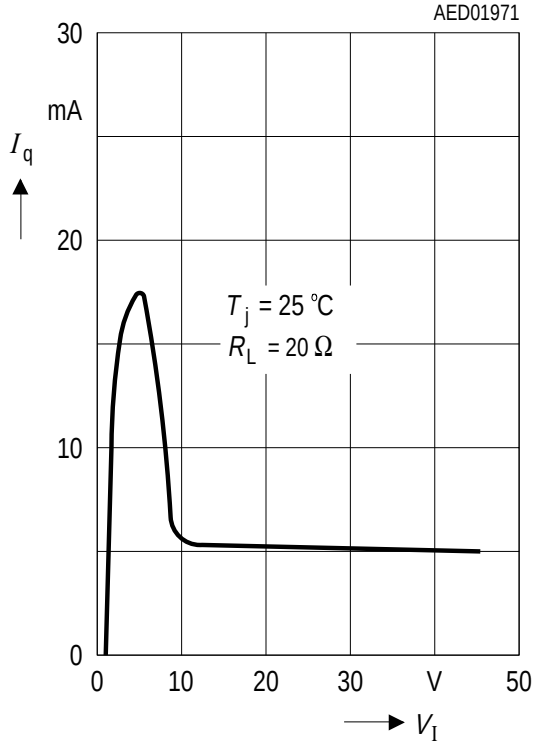


Typical Performance Characteristics for V85:

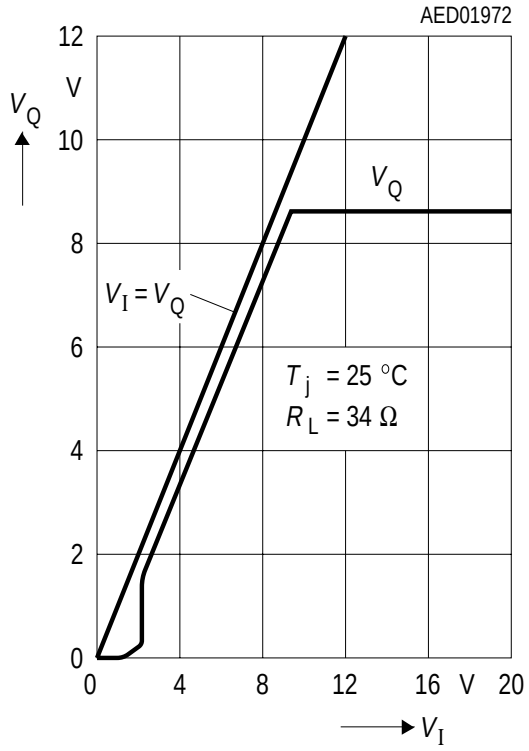
Output Voltage V_Q versus Temperature T_j



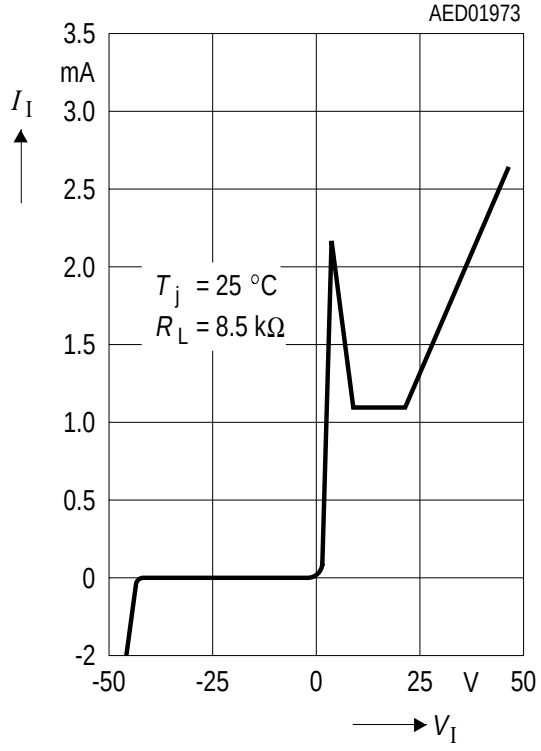
Current Consumption I_q versus Input Voltage V_I



Low Voltage Behavior

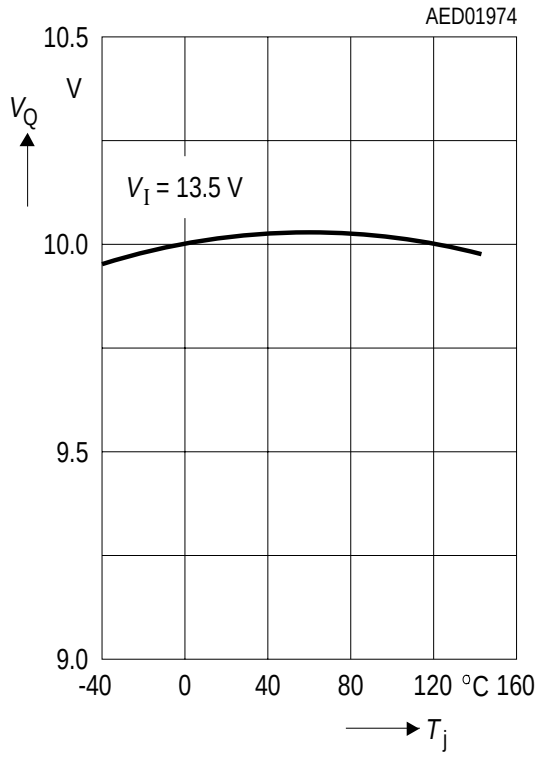


High Voltage Behavior

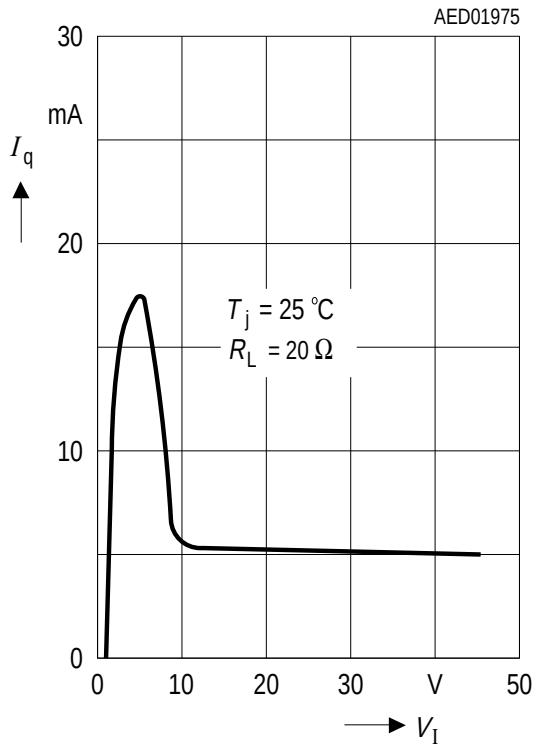


Typical Performance Characteristics for V10:

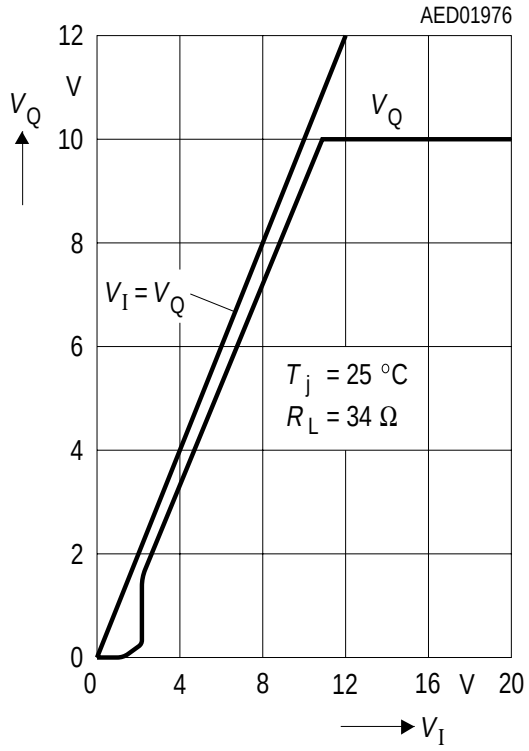
Output Voltage V_Q versus Temperature T_j



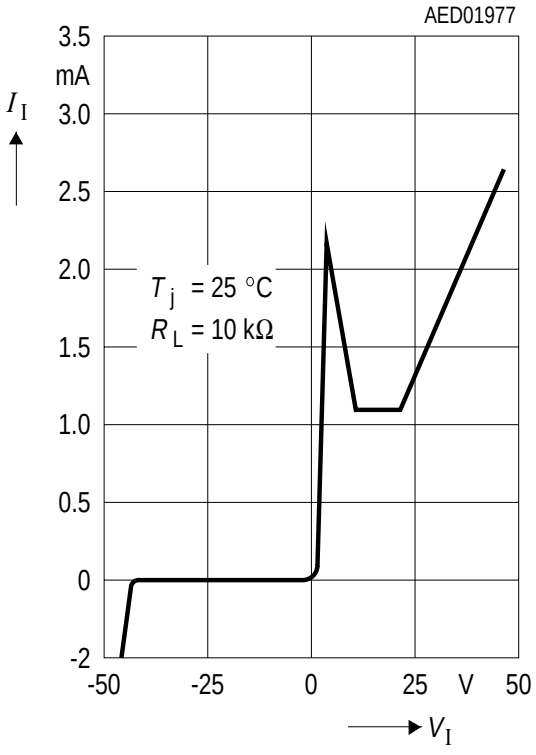
Current Consumption I_q versus Input Voltage V_I



Low Voltage Behavior



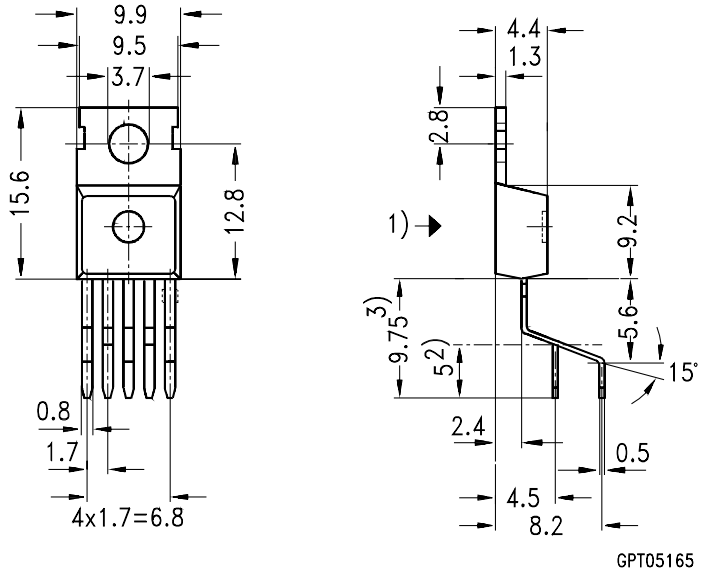
High Voltage Behavior



Package Outlines

P-TO220-5-3

(Plastic Transistor Single Outline)



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

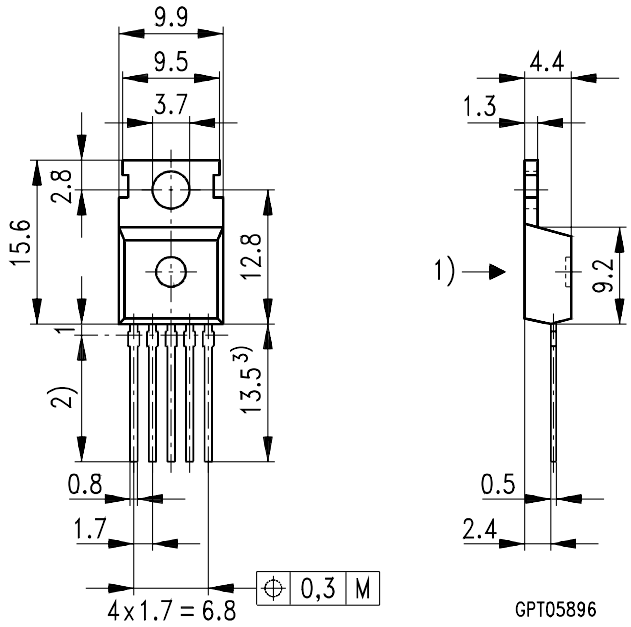
Sorts of Packing

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

Dimensions in mm

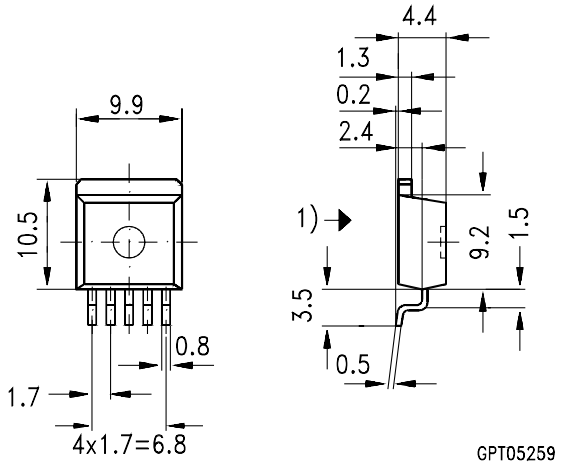
P-TO220-5-43

(Plastic Transistor Single Outline)



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

P-TO220-5-122
(Plastic Transistor Single Outline)

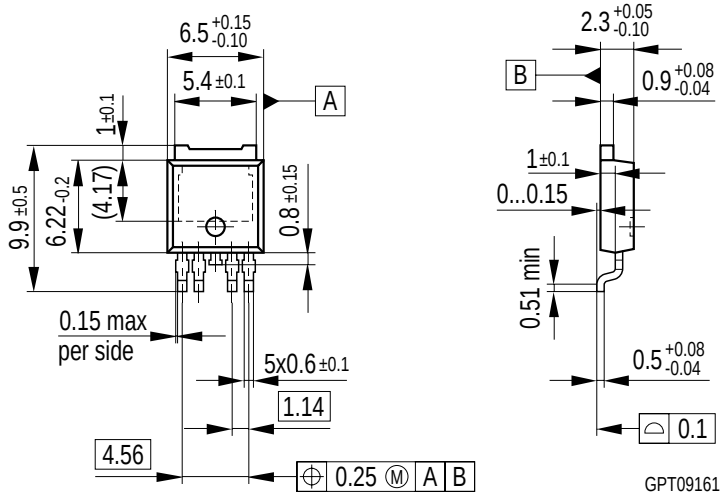


1) shear and punch direction no burrs this surface

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