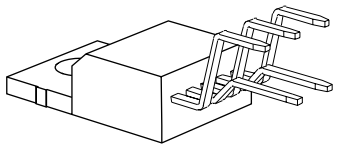
SIEMENS

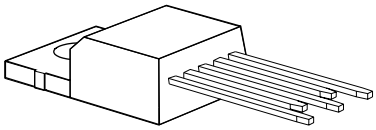
## 5-V Low-Drop Voltage Regulator TLE 4260

### Features

- Low-drop voltage
- Very low quiescent current
- Low starting current consumption
- Integrated temperature protection
- Protection against reverse polarity
- Input voltage up to 42 V
- Overvoltage protection up to 65 V (≤ 400 ms)
- Short-circuit proof
- Suited for automotive electronics
- Wide temperature range
- EMC proofed (100 V/m)



**P-TO220-5-1**



**P-TO220-5-2**

| | Type | Ordering Code | Package |
|---|---|---|---|
| ▼ | TLE 4260 | Q67000-A8187 | P-TO220-5-1 |
| ▼ | TLE 4260 S | Q67000-A9044 | P-TO220-5-2 |

▼ Please also refer to the new pin compatible device TLE 4270

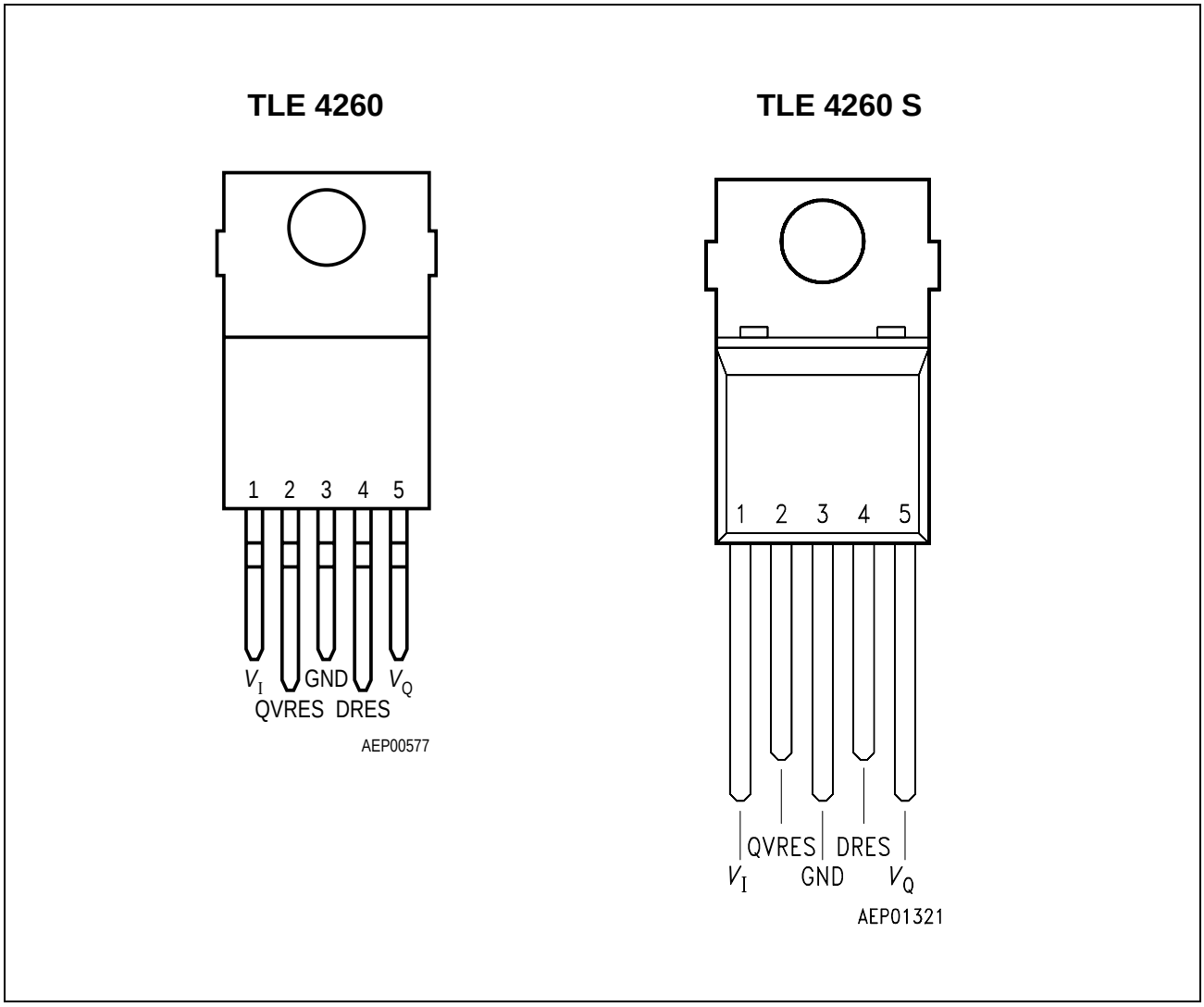
### Functional Description

TLE 4260; S is a 5-V low-drop fixed-voltage regulator in a P-TO220-5-H/S package. The maximum input voltage is 42 V (65 V/≤ 400 ms). The device can produce an output current of more than 500 mA. It is shortcircuit-proof and incorporates temperature protection that disables the circuit at unpermissibly high temperatures.

Due to the wide temperature range of – 40 to 150 °C, the TLE 4260; S is also suitable for use in automotive applications.

The IC regulates an input voltage $V_I$ in the range 6 < $V_I$ < 35 V to $V_{Qnominal}$ = 5.0 V. A reset signal is generated for an output voltage of $V_Q$ < 4.75 V. The reset delay can be set externally with a capacitor. If the output current is reduced below 10 mA, the regulator switches internally to standby and the reset generator is turned off. The standby current drops to max. 700 µA.

**Pin Configuration**
(top view)




**Pin Definitions and Functions (TLE 4260 and TLE 4260 S)**

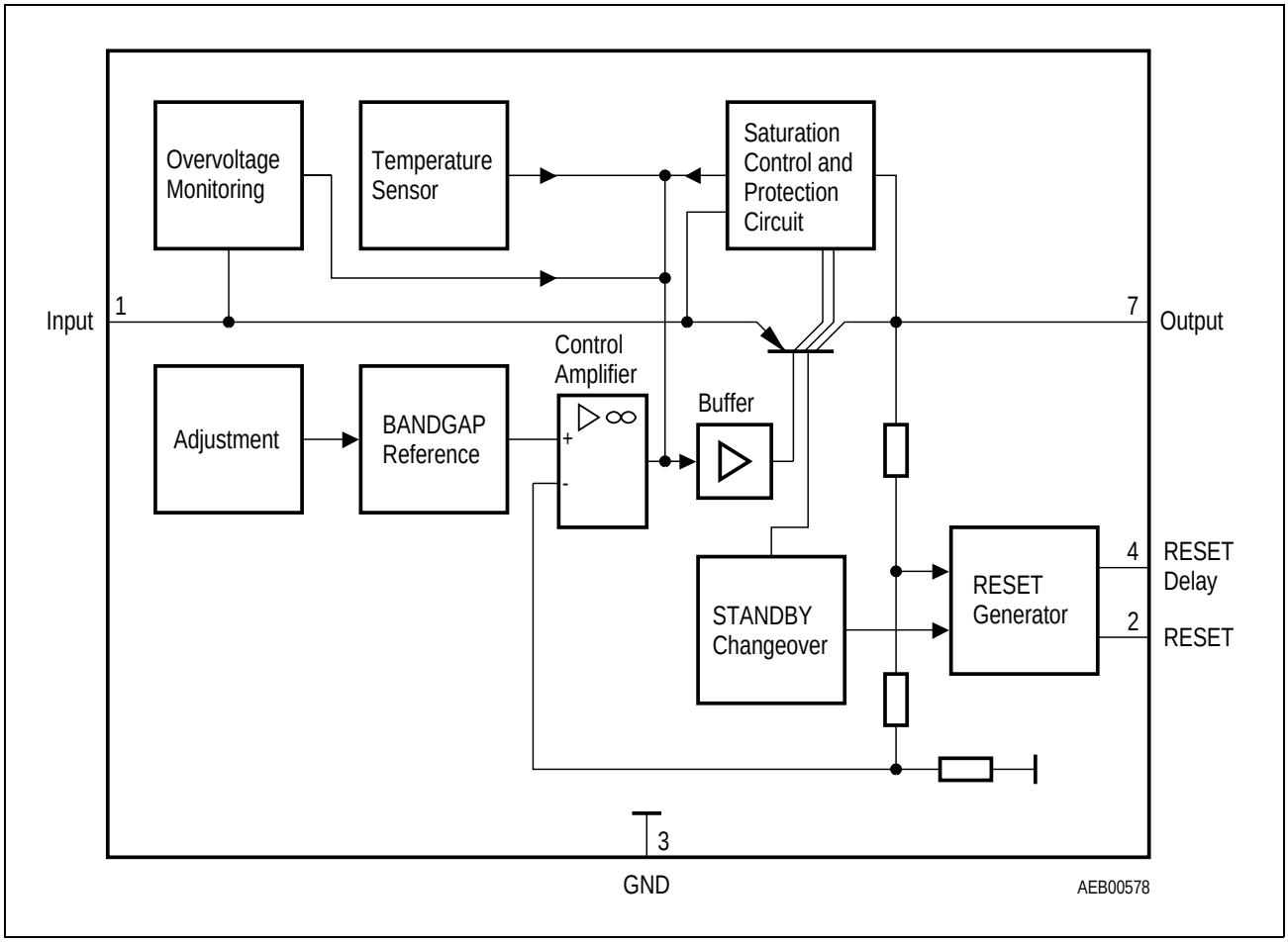
| Pin No. | Symbol | Function |
|---|---|---|
| 1 | $V_I$ | **Input**; block directly to ground at the IC by a 470-nF capacitor |
| 2 | QVRES | **Reset output**; open collector output controlled by the reset delay |
| 3 | GND | **Ground** |
| 4 | DRES | **Reset delay**; wired to ground with a capacitor |
| 5 | $V_Q$ | **5-V output voltage**; block to ground with a 22-µF capacitor |

## Circuit Description

The control amplifier compares a reference voltage, which is kept highly accurate by resistance adjustment, 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 over-saturation of the power element. If the output voltage goes below 96% of its typical value, an external capacitor is discharged on pin 4 by the reset generator. If the voltage on the capacitor reaches the lower threshold $V_{ST}$, a reset signal is issued on pin 2 and not cancelled again until the upper threshold $V_{DT}$ is exceeded. For an output current of less than $I_{QN\ Off}$ = 10 mA the standby changeover turns off the reset generator. The latter is turned on again when the output current increases, the output voltage drops below 4.2 V or the delay capacitor is discharged by external measures.

The IC also incorporates a number of internal circuits for protection against:

- Overload
- Overvoltage
- Overtemperature
- Reverse polarity




**Block Diagram**

## Absolute Maximum Ratings

| Parameter | Symbol | Limit Values | | Unit | Remarks |
|---|---|---|---|---|---|
| | | min. | max. | | |
| **Input (Pin 1)** | | | | | |
| Input voltage | $V_I$ | – 42 | 42 | V | – |
| | $V_I$ | – | 65 | V | $t \leq 400$ ms |
| Input current | $I_I$ | – | 1.6 | A | – |
| **Reset Output (Pin 2)** | | | | | |
| Voltage | $V_R$ | – 0.3 | 42 | V | – |
| Current | $I_R$ | – | – | – | internally limited |
| **Ground (Pin 3)** | | | | | |
| Current | $I_{GND}$ | – 0.5 | – | A | – |
| **Reset Delay (Pin 4)** | | | | | |
| Voltage | $V_D$ | – 0.3 | 42 | V | – |
| Current | $I_D$ | – | – | – | internally limited |
| **Output (Pin 5)** | | | | | |
| Differential voltage | $V_I - V_Q$ | – 5.25 | $V_I$ | V | – |
| Current | $I_Q$ | – | 1.4 | A | – |
| **Temperature** | | | | | |
| Junction temperature | $T_j$ | – | 32 | °C | – |
| Storage temperature | $T_{stg}$ | – 50 | 150 | °C | – |

## Operating Range

| Parameter | Symbol | Limit Values | | Unit | Remarks |
|---|---|---|---|---|---|
| | | min. | max. | | |
| Input voltage | $V_I$ | – | 32 | V | 1) |
| Junction temperature | $T_j$ | – 40 | 165 | °C | – |

## Thermal Resistances

| | | | | | |
|---|---|---|---|---|---|
| Junction ambient | $R_{thja}$ | – | 65 | K/W | – |
| Junction case | $R_{thjc}$ | – | 3 | K/W | – |

1) See diagram “Output Current versus Input Voltage”

## Characteristics

$V_I$ = 13.5 V; $T_j$ = 25 °C; (unless otherwise specified)

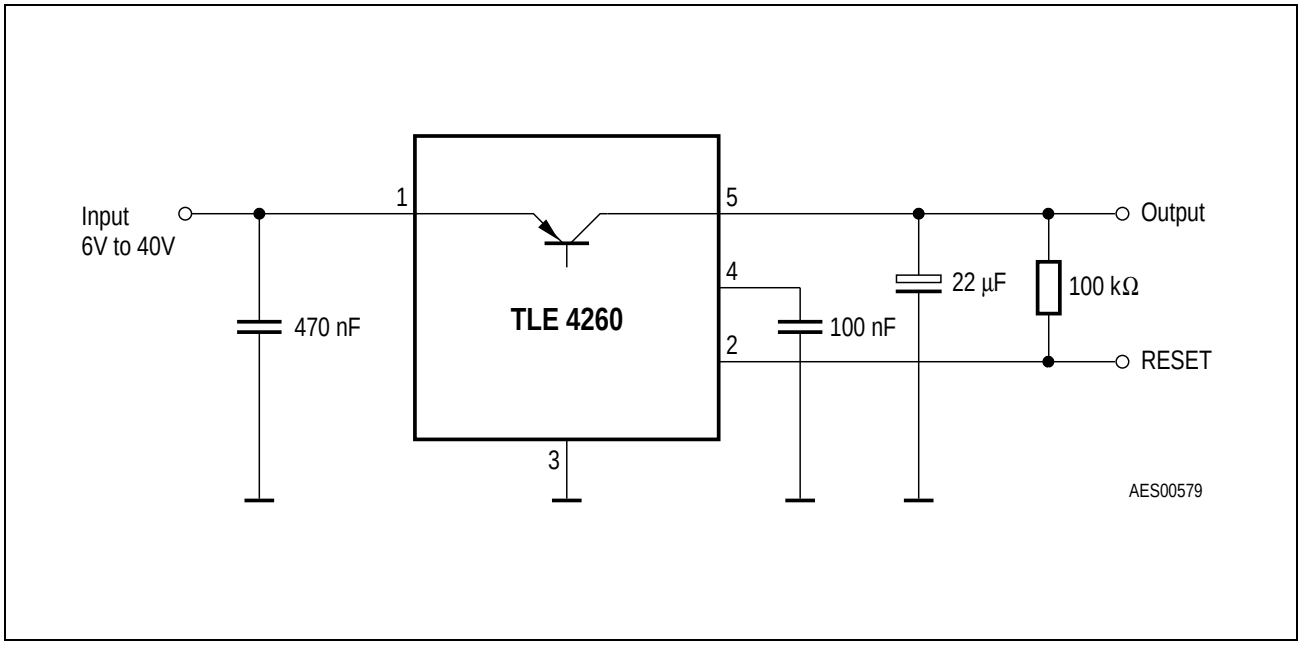
| Parameter | Symbol | Limit Values | | | Unit | Test Condition |
|---|---|---|---|---|---|---|
| | | min. | typ. | max. | | |
| **Normal Operation** | | | | | | |
| Output voltage | $V_Q$ | 4.75 | 5.0 | 5.25 | V | 25 mA ≤ $I_Q$ ≤ 500 mA<br>6 V ≤ $V_I$ ≤ 28 V<br>– 40 °C ≤ $T_j$ ≤ 125 °C |
| Short -circuit current | $I_{SC}$ | 500 | 1000 | – | mA | $V_I$ =17 V to 28 V;<br>$V_Q$ = 0 V |
| Current consumption<br>$I_q = I_I - I_Q$ | $I_q$ | – | 8.5 | 10 | mA[1)] | 6 V ≤ $V_I$ ≤ 28 V<br>$I_Q$ = 150 mA |
| Current consumption<br>$I_q = I_I - I_Q$ | $I_q$ | – | 50 | 65 | mA[1)] | 6 V ≤ $V_I$ ≤ 28 V<br>$I_Q$ = 500 mA |
| Current consumption<br>$I_q = I_I - I_Q$ | $I_q$ | – | – | 80 | mA[1)] | $V_I$ ≤ 6 V<br>$I_Q$ = 500 mA |
| Drop voltage | $V_{DR}$ | – | 0.35 | 0.5 | V | $V_I$ = 4.5 V; $I_Q$ = 0.5 A |
| Drop voltage | $V_{DR}$ | – | 0.2 | 0.3 | V | $V_I$ = 4.5 V; $I_Q$ = 0.15 A |
| Load regulation | $\Delta V_Q$ | – | 15 | 35 | mV | 25 mA ≤ $I_Q$ ≤ 500 mA |
| Supply-voltage regulation | $\Delta V_Q$ | – | 15 | 50 | mV | $V_I$ ≤ 6 V to 28 V;<br>$I_Q$ = 100 mA |
| Supply-voltage regulation | $\Delta V_Q$ | – | 5 | 25 | mV | $V_I$ ≤ 6 V to 16 V;<br>$I_Q$ = 100 mA |
| Ripple rejection | $SVR$ | – | 54 | – | dB | $f$ = 100 Hz;<br>$V_r$ = 0.5 $V_{pp}$ |
| Temperature drift of output voltage[1)] | $\alpha_{VQ}$ | – | $2 \times 10^{-4}$ | – | 1/°C | – |
| **Standby Operation** | | | | | | |
| Quiscent current;<br>$I_q = I_I - I_Q$ | $I_q$ | – | 500 | 700 | µA | 10 V ≤ $V_I$ ≤ 16 V;<br>$I_Q$ = 0 mA |
| Quiscent current;<br>$I_q = I_I - I_Q$ | $I_q$ | – | 750 | 850 | µA | 10 V ≤ $V_I$ ≤ 16 V;<br>$I_Q$ = 5 mA |

**Characteristics** (cont'd)

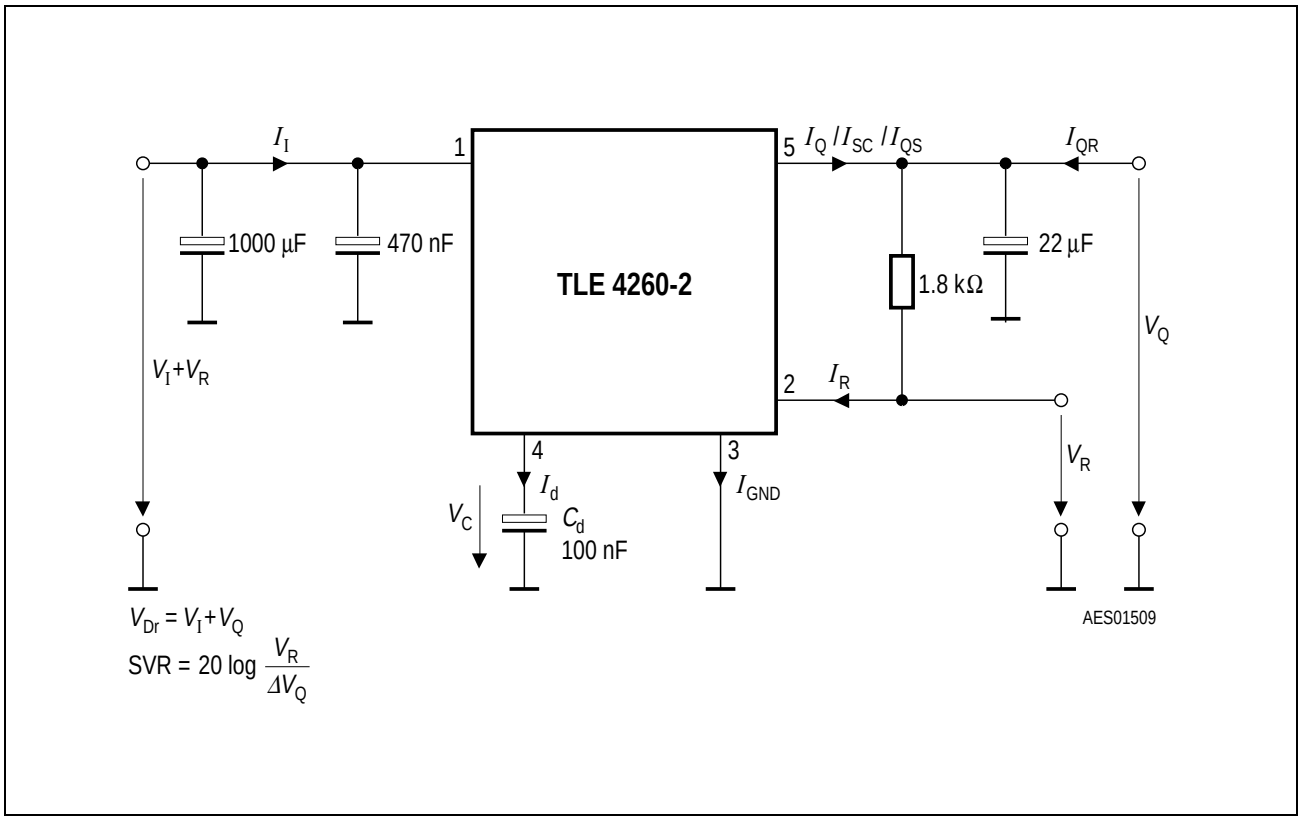
$V_I$ = 13.5 V; $T_j$ = 25 °C; (unless otherwise specified)

| Parameter | Symbol | Limit Values | | | Unit | Test Condition |
|---|---|---|---|---|---|---|
| | | min. | typ. | max. | | |
| **Standby Off/Normal On** | | | | | | |
| Current consumption | $I_{qSOFF}$ | – | 1.0 | 1.2 | mA | see test diagram |
| Current consumption | $I_{qNON}$ | – | 1.7 | 2.2 | mA | see test diagram |
| **Normal Off/Standby On** | | | | | | |
| Current consumption | $I_{qNOFF}$ | – | 1.55 | 2.00 | mA | see test diagram |
| Current consumption | $I_{qSON}$ | – | 850 | 1050 | µA | see test diagram |
| Switching threshold | $I_{QNOFF}$ | 7.5 | 10 | 12.5 | mA | see test diagram |
| Switching hysteresis | $\Delta I_Q$ | 2.25 | 3 | 4 | mA | see test diagram |
| **Reset Generator** | | | | | | |
| Switching threshold | $V_{RT}$ | 94 | 96 | 97 | % | in % of $V_Q$; $I_Q$ > 500 mA; $V_I$ = 6 V |
| Saturation voltage | $V_R$ | – | 0.25 | 0.40 | V | $I_R$ = 3 mA; $V_I$ = 4.5 V |
| Reverse current | $I_R$ | – | – | 1 | µA | $V_R$ = 5 V |
| Charge current | $I_D$ | 7 | 10 | 13 | µA | – |
| Switching threshold | $V_{ST}$ | 0.9 | 1.1 | 1.3 | V | – |
| Delay switching threshold | $V_{DT}$ | 2.15 | 2.50 | 2.75 | V | – |
| Delay time | $t_D$ | – | 25 | – | ms | $C_D$ = 100 nF |
| Delay time | $t_t$ | – | 5 | – | µs | $C_D$ = 100 nF |
| **General Data** | | | | | | |
| Turn-Off voltage | $V_{IOFF}$ | 40 | 43 | 45 | V | $I_Q$ < 1 mA |
| Turn-Off hysteresis | $\Delta V_I$ | – | 3.0 | – | V | – |
| Leakage current | $I_{QS}$ | – | 500 | – | µA | $V_Q$ = 0 V; $V_I$ = 45 V |
| Reverse output current | $I_{QR}$ | – | – | 1.5 | mA | $V_Q$ = 5 V; $V_I$ = open |

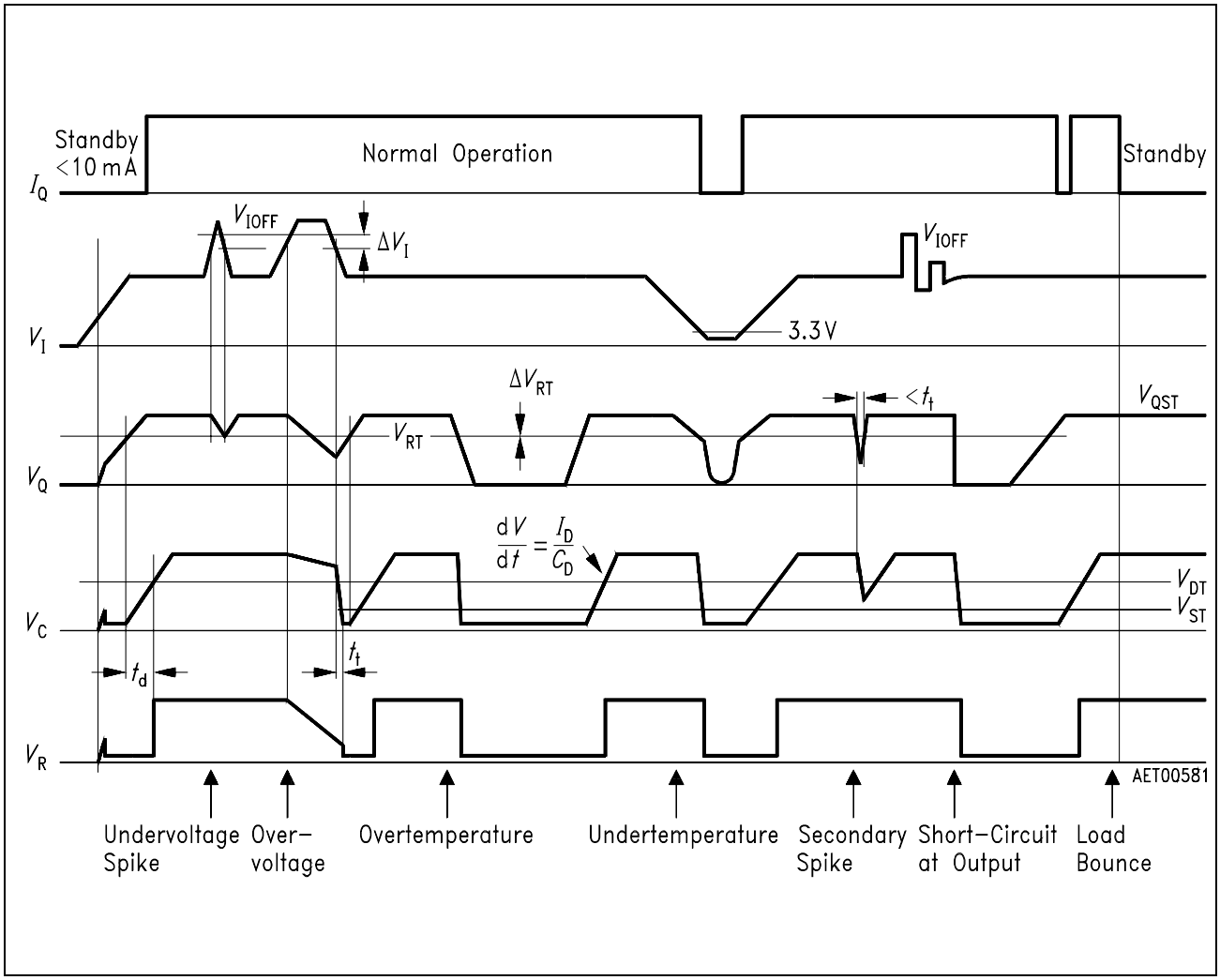
[1] See diagram



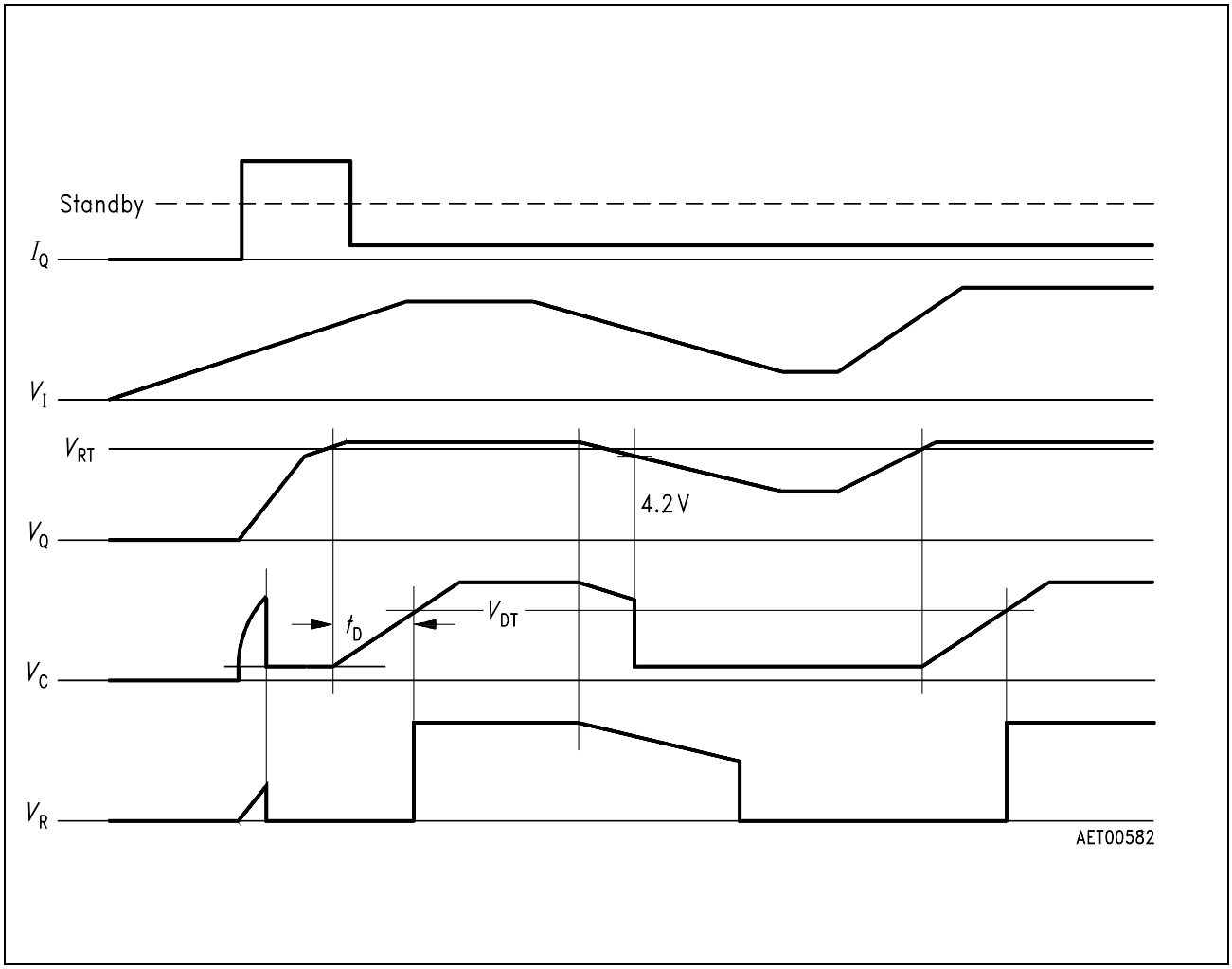

**Application Circuit**




**Test Circuit**

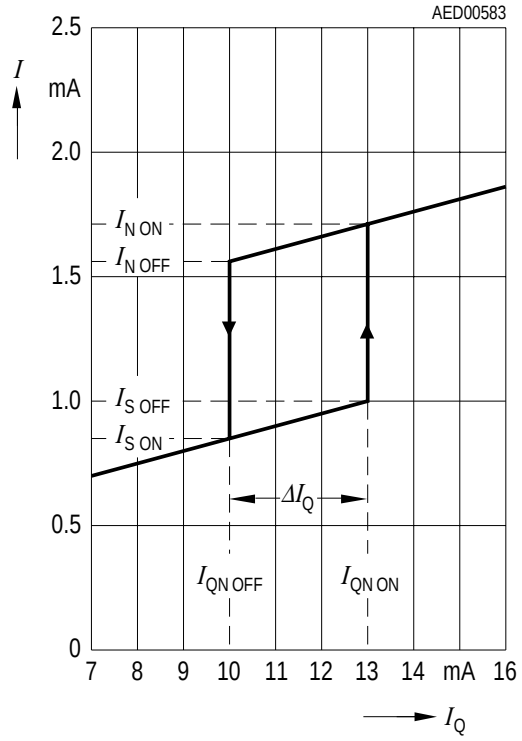



**Time Responce**

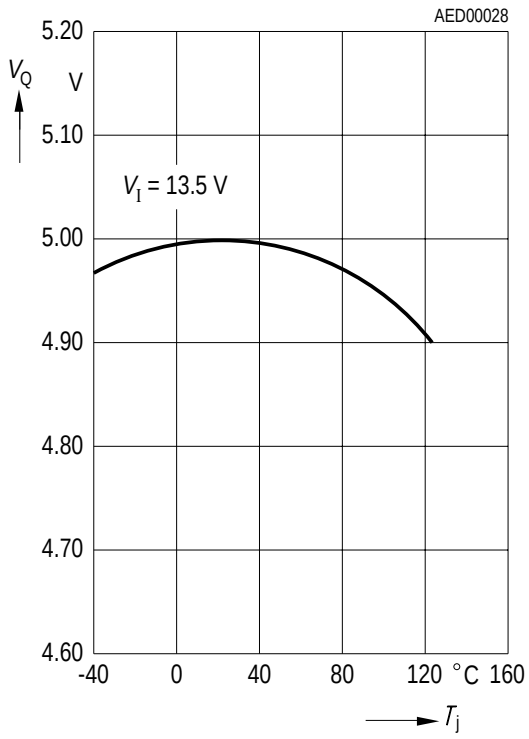



**Time Responce in Standby Condition**

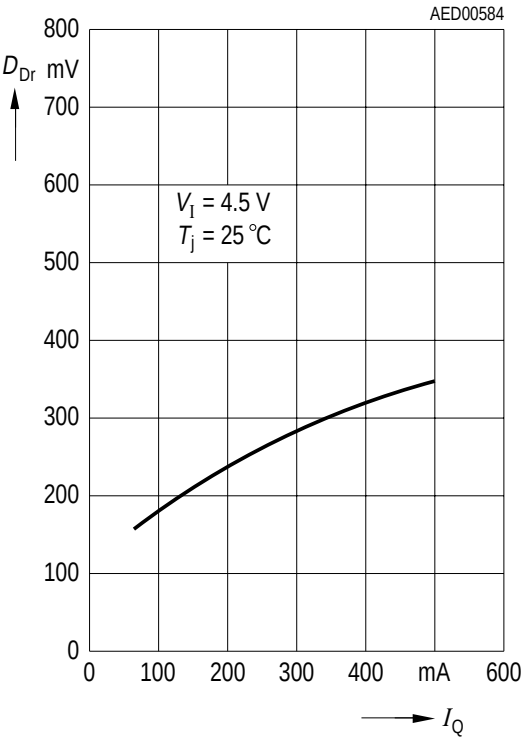
## Standby/Normal Changeover



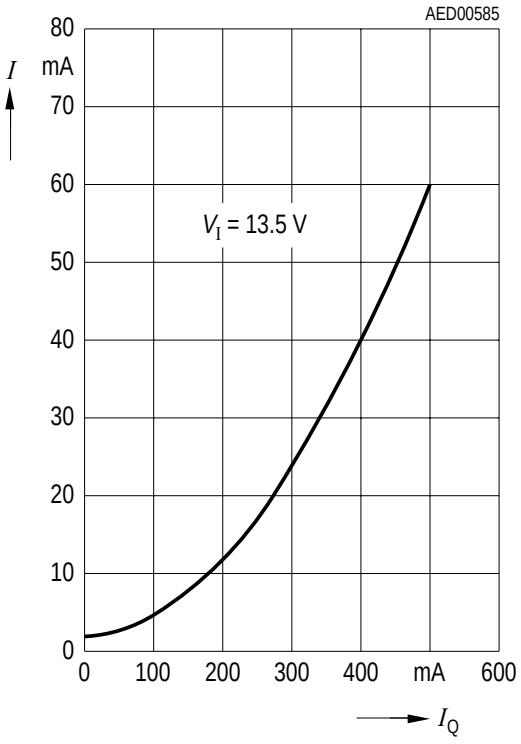

## Output Voltage versus Temperature



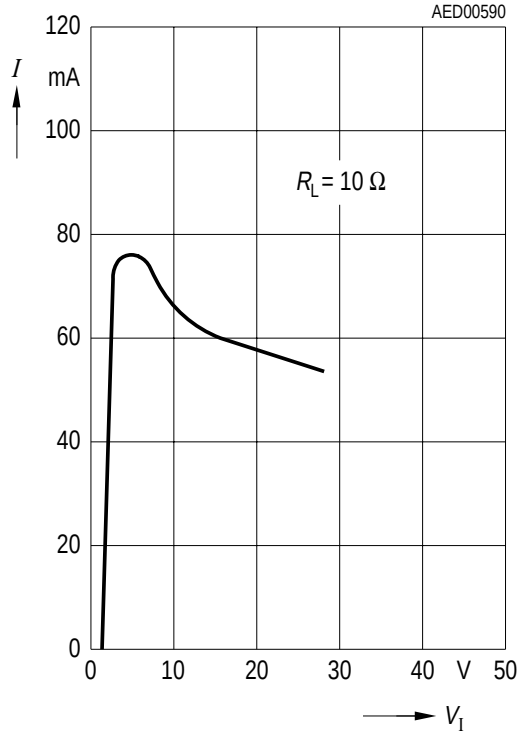

## Drop Voltage versus Output Current



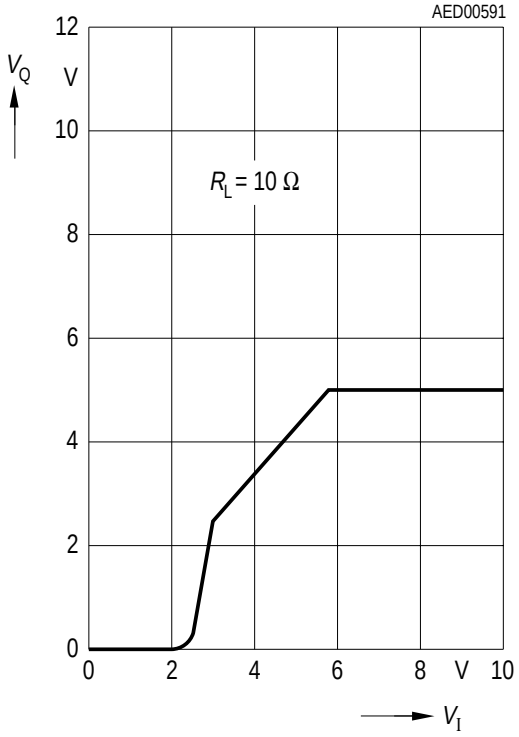

## Current Consumption versus Output Current



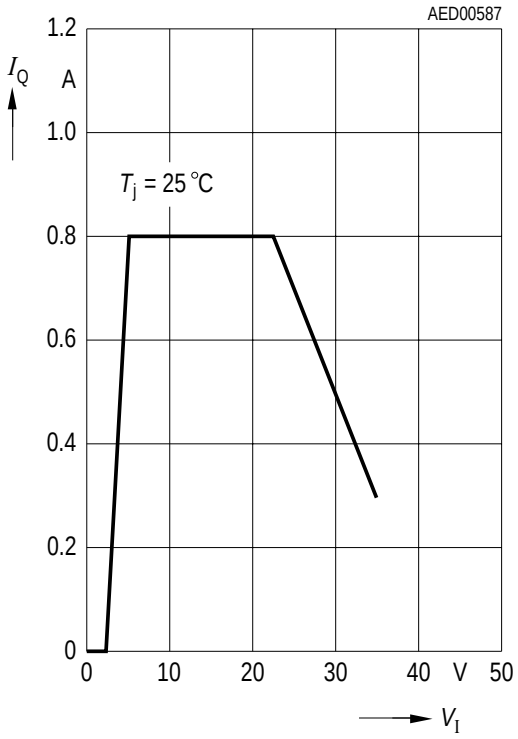
## Current Consumption versus Input Voltage




## Output Voltage versus Input Voltage



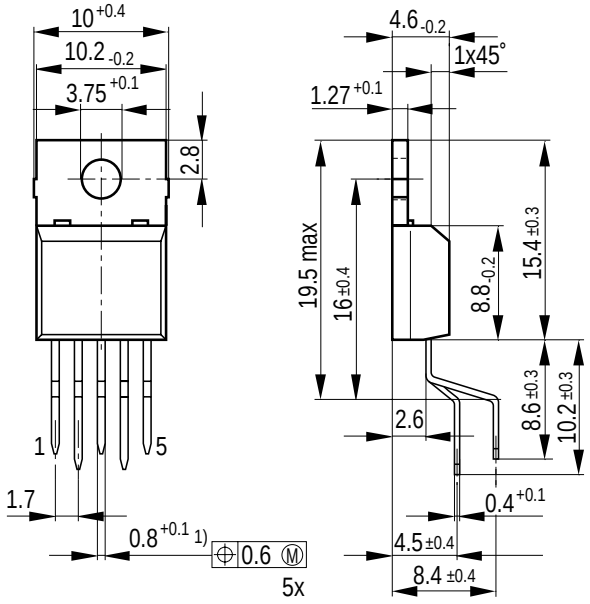

## Output Current versus Input Voltage



## Package Outlines

**P-TO220-5-1**

(Plastic Transistor Single Outline)




1) $1_{-0.15}$ at dam bar (max 1.8 from body)

1) $1_{-0.15}$ im Dichtstegbereich (max 1.8 vom Körper)

GPT05107

Weigth approx. 2.1 g

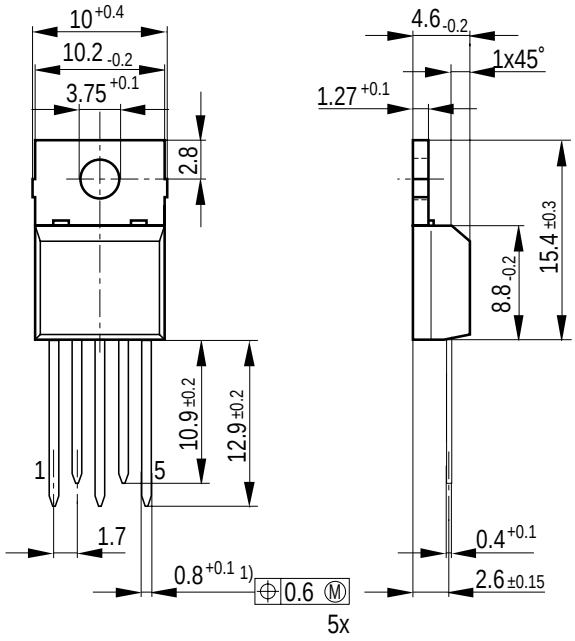
**Sorts of Packing**

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

Dimensions in mm

**P-TO220-5-1**

(Plastic Transistor Single Outline)




1) $1_{-0.15}$ at dam bar (max 1.8 from body)

1) $1_{-0.15}$ im Dichtstegbereich (max 1.8 vom Körper)

GPT05256

Weigth approx. 2.1 g

**Sorts of Packing**

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

Dimensions in mm