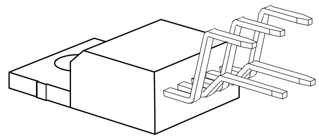
SIEMENS

5-V Low-Drop Voltage Regulator

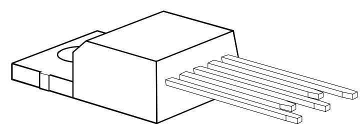
TLE 4260

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

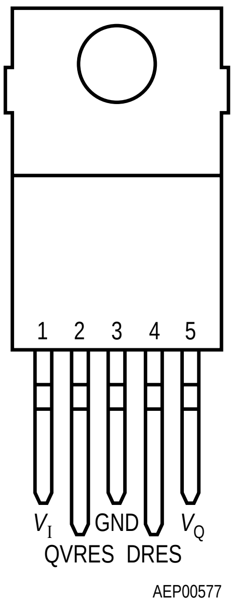
TLE 4260; S is a 5-V low-drop fixed-voltage regulator in a P-TO220-5-H/S package. The maximum input voltage is 42 V (65 V/≤ 400 ms). The device can produce an output current of more than 500 mA. It is shortcircuit-proof and incorporates temperature protection that disables the circuit at unpermissibly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

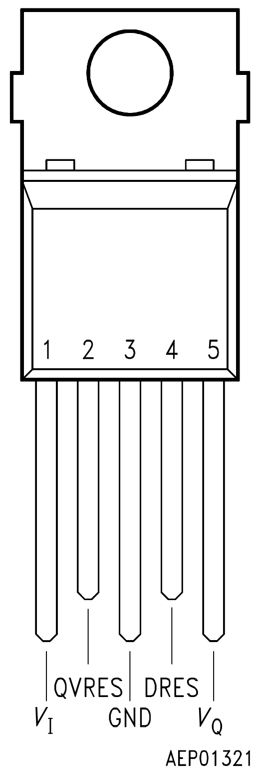
The IC regulates an input voltage V_I in the range 6 < V_I < 35 V to $V_{Qnominal}$ = 5.0 V. A reset signal is generated for an output voltage of V_Q < 4.75 V. The reset delay can be set externally with a capacitor. If the output current is reduced below 10 mA, the regulator switches internally to standby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

Pin Configuration
(top view)

TLE 4260



TLE 4260 S



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

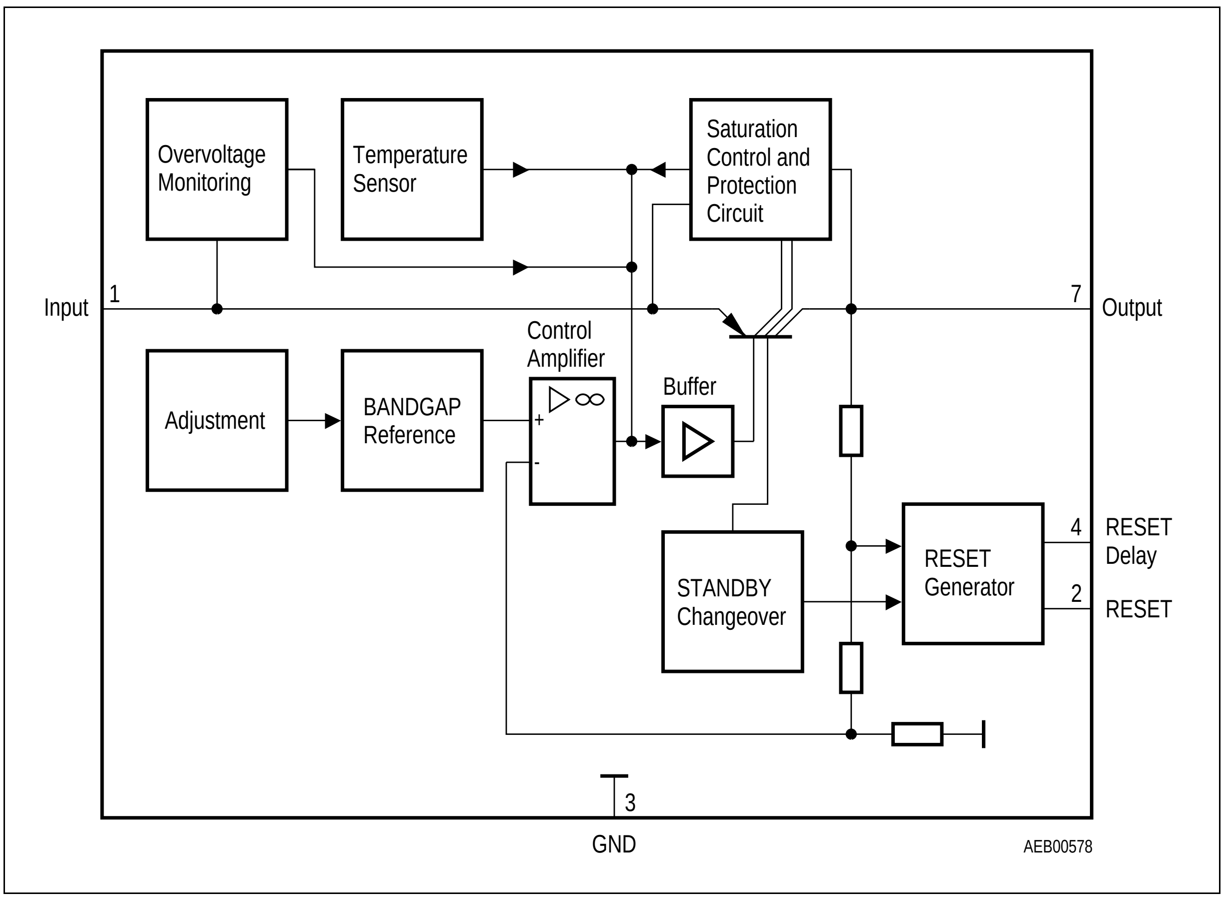
Pin No.	Symbol	Function
1	V_I	**Input**; block directly to ground at the IC by a 470-nF capacitor
2	QVRES	**Reset output**; open collector output controlled by the reset delay
3	GND	**Ground**
4	DRES	**Reset delay**; wired to ground with a capacitor
5	V_Q	**5-V output voltage**; block to ground with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

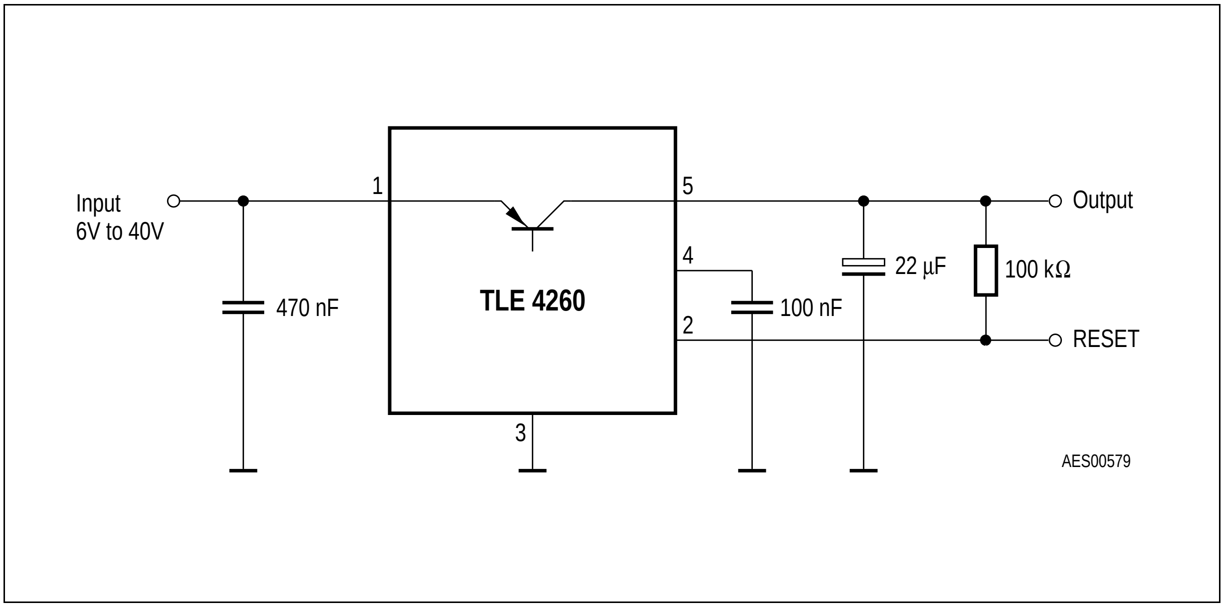
Parameter	Symbol	Limit Values			Unit	Test Condition
		min.	typ.	max.		
Normal Operation						
Output voltage	V_Q	4.75	5.0	5.25	V	25 mA ≤ I_Q ≤ 500 mA 6 V ≤ V_I ≤ 28 V – 40 °C ≤ T_j ≤ 125 °C
Short -circuit current	I_{SC}	500	1000	–	mA	V_I =17 V to 28 V; V_Q = 0 V
Current consumption $I_q = I_I - I_Q$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

Characteristics (cont'd)

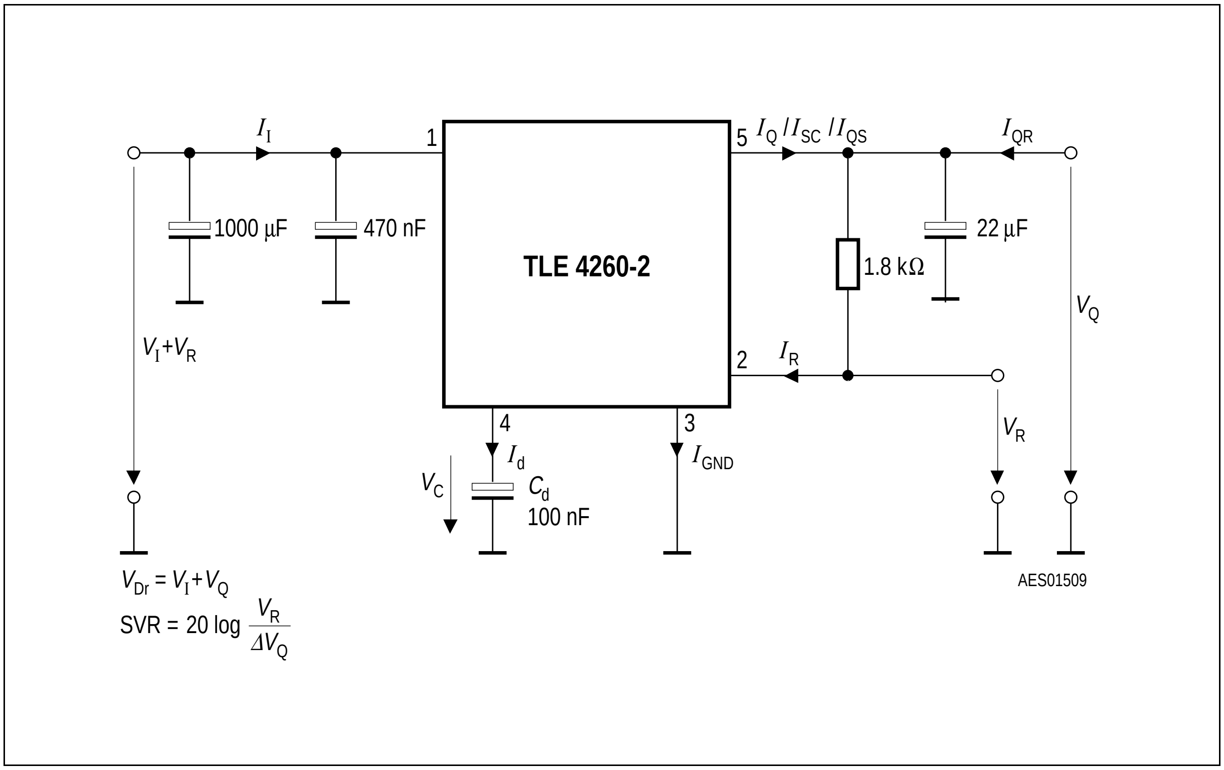
V_I = 13.5 V; T_j = 25 °C; (unless otherwise specified)

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	ΔI_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	ΔV_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

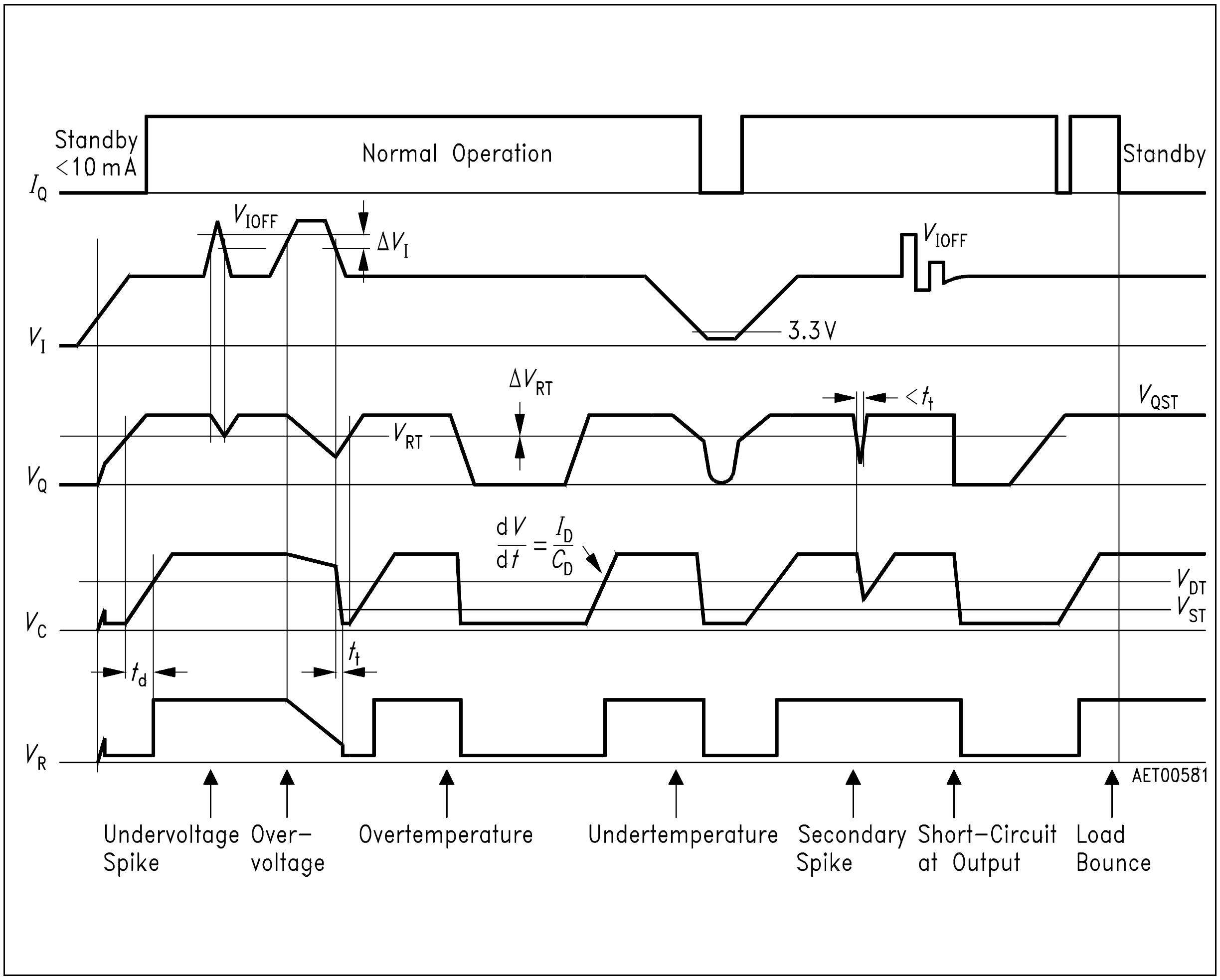
1) See diagram



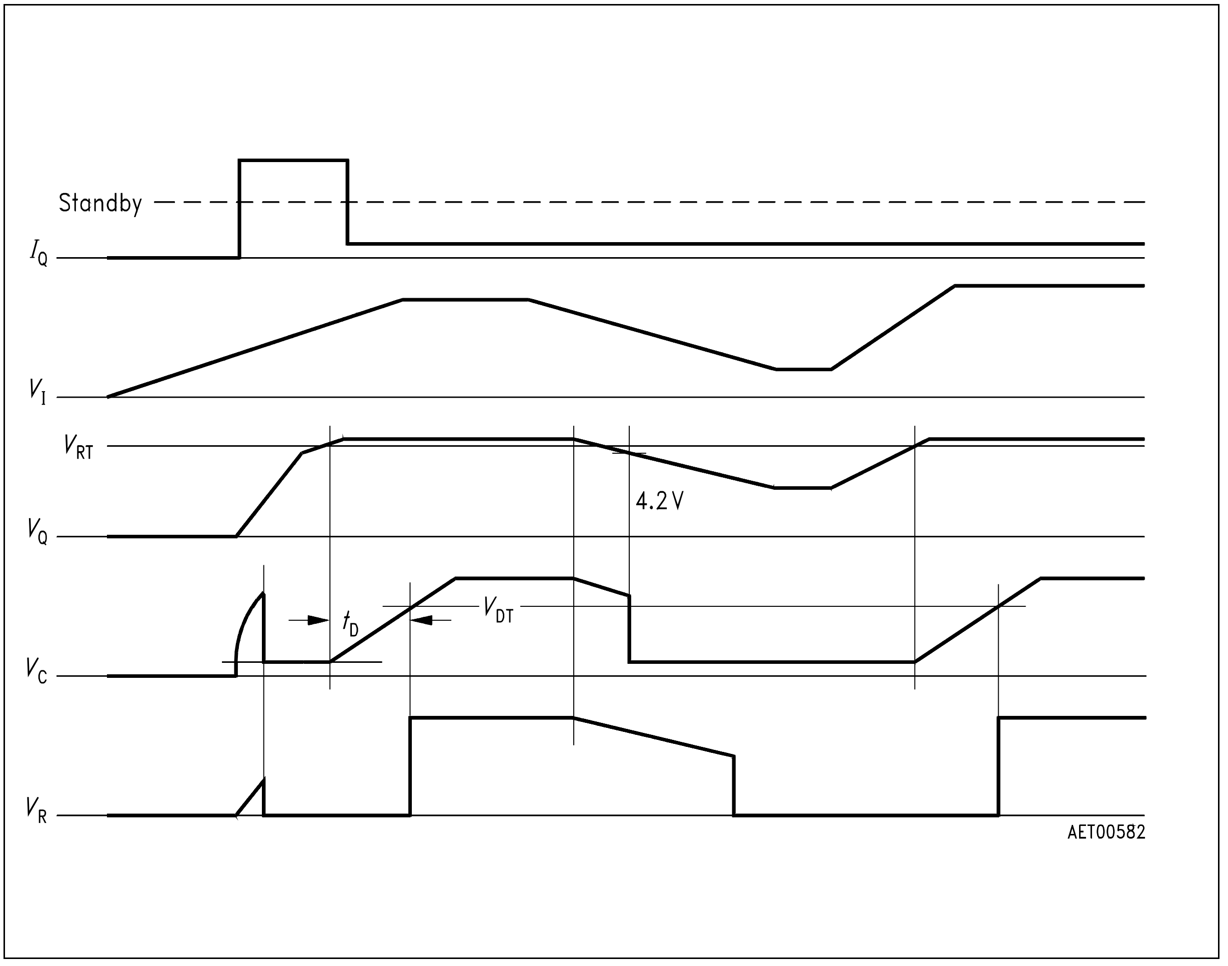
Application Circuit



Test Circuit

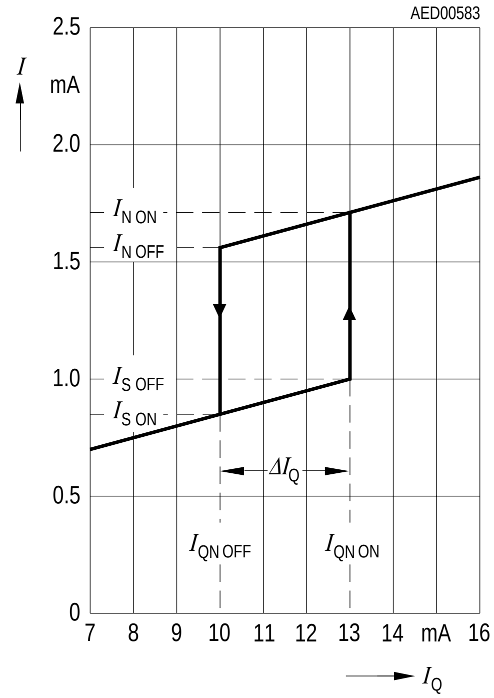


Time Responce

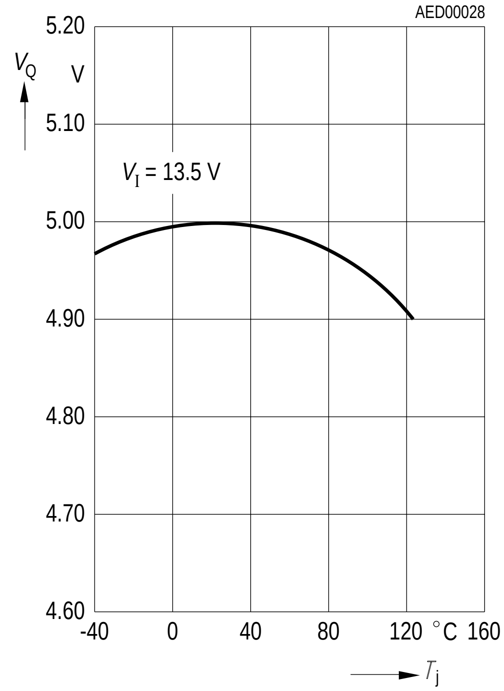


Time Responce in Standby Condition

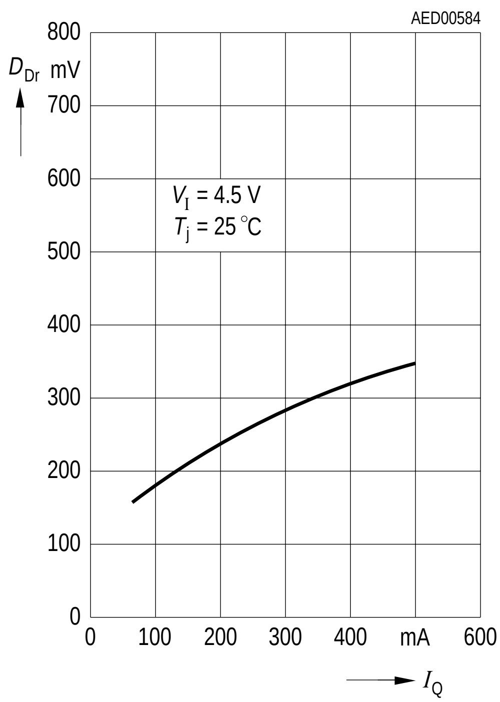
Standby/Normal Changeover



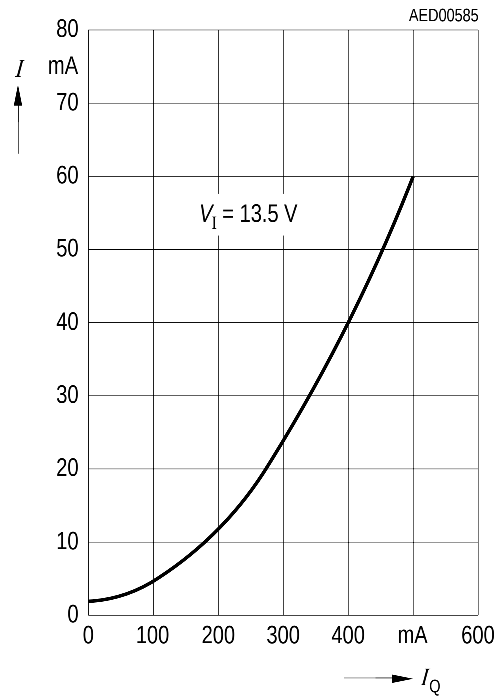
Output Voltage versus Temperature



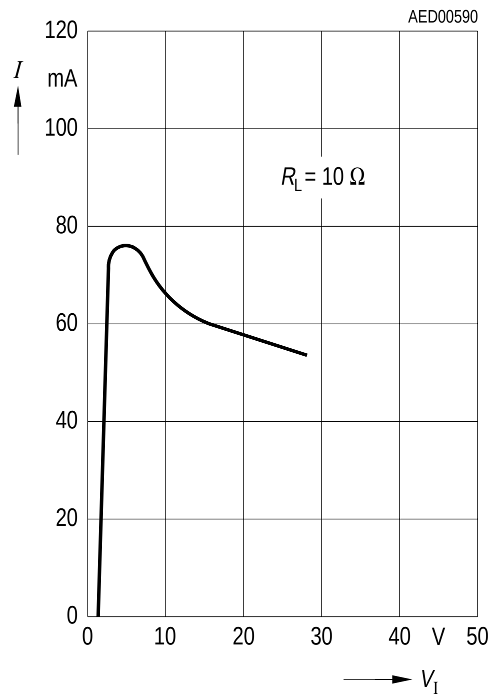
Drop Voltage versus Output Current



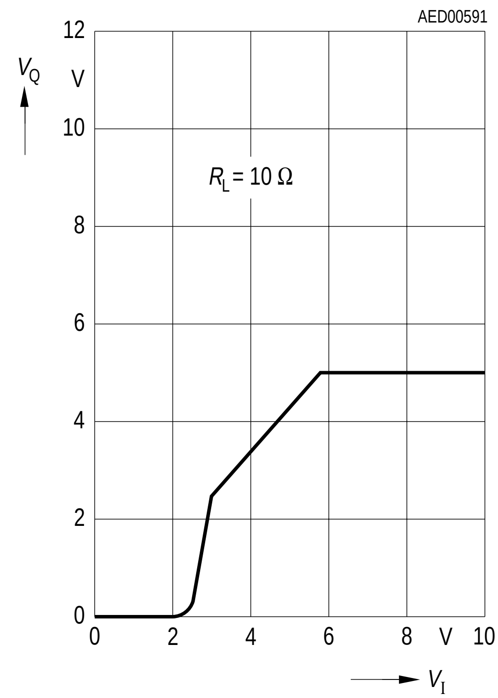
Current Consumption versus Output Current



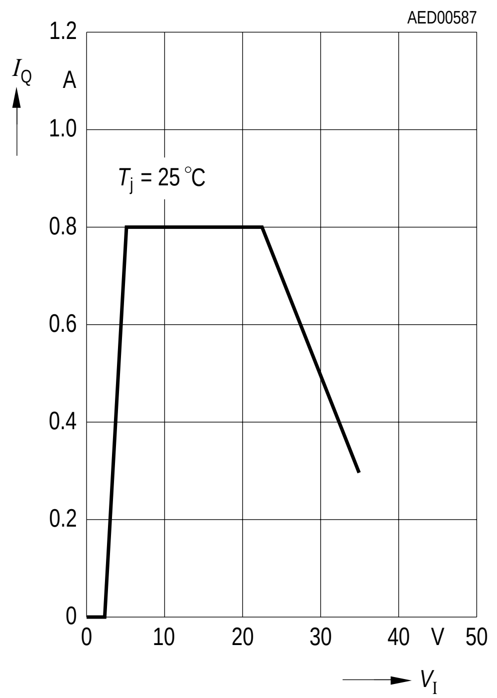
Current Consumption versus Input Voltage



Output Voltage versus Input Voltage



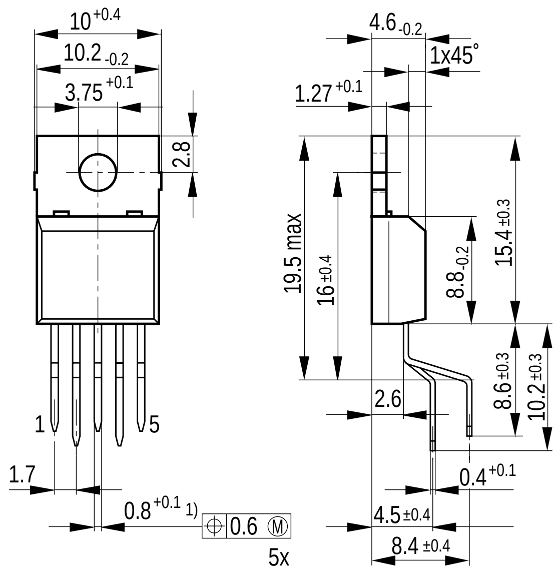
Output Current versus Input Voltage



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

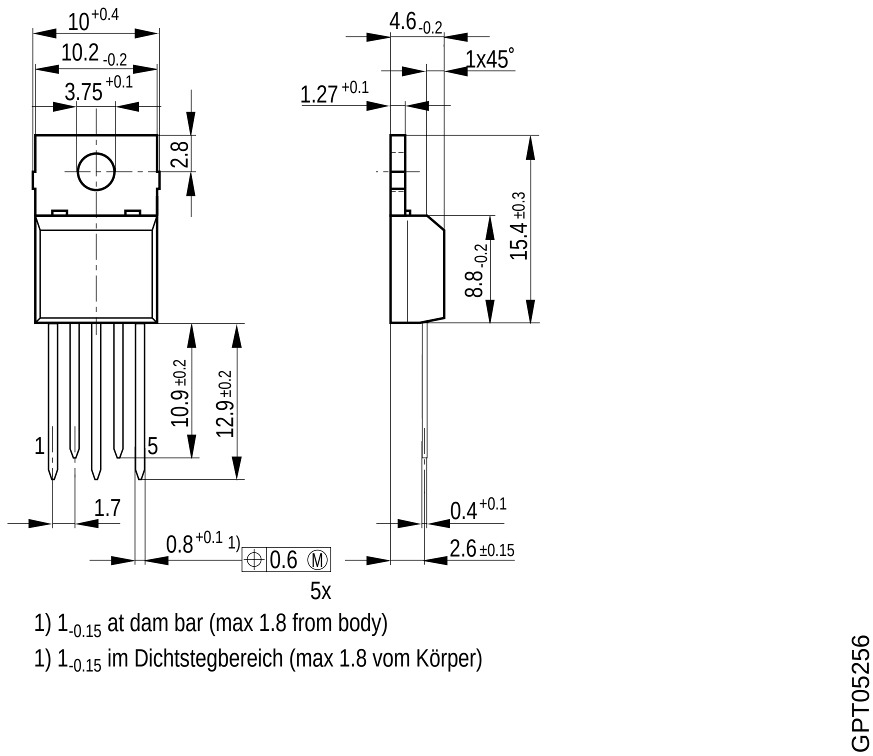
Sorts of Packing

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)



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