SIEMENS

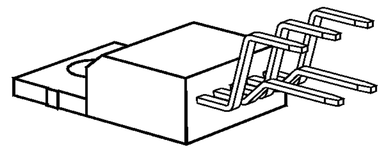
5-V Low-Drop Voltage Regulator

TLE 4260-2

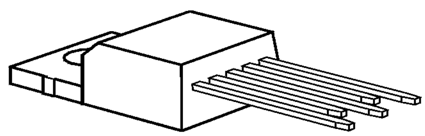
Bipolar IC

Features

- High accuracy 5 V ± 2%
- 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 60 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 4260-2	Q67000-A9128	P-TO220-5-1
• TLE 4260-2S	Q67000-A9187	P-TO220-5-2

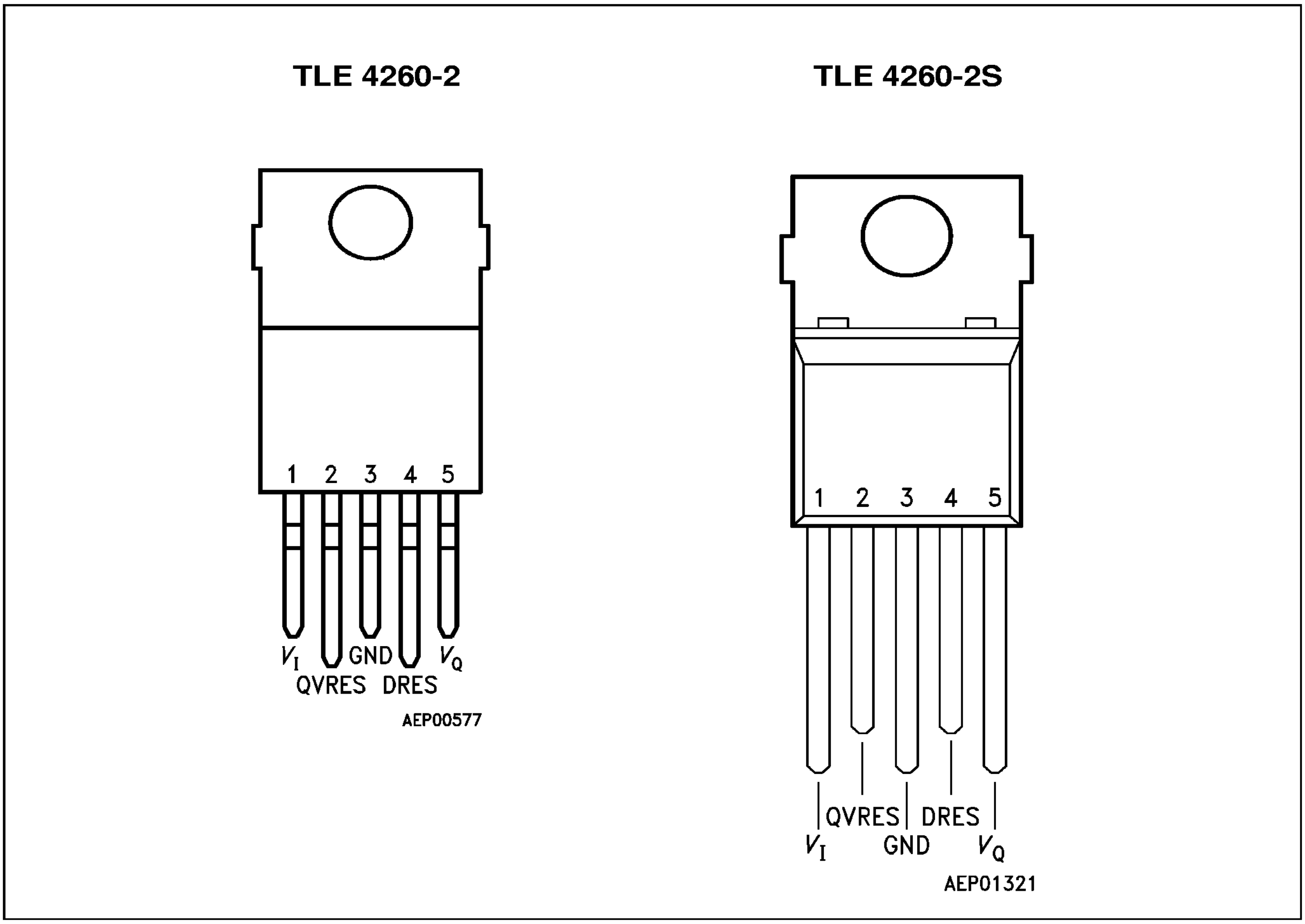
• Please also refer to the new pin compatible device TLE 4270

Functional Description

TLE 4260-2 is a 5 V low-drop fixed-voltage regulator in a P-TO220-5-H 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 4260-2 is also suitable for use in automotive applications.

The IC regulates an input voltage V_I in the range $5.5 < V_I < 35$ 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.



Pin Configuration
(top view)

Pin Definitions and Functions

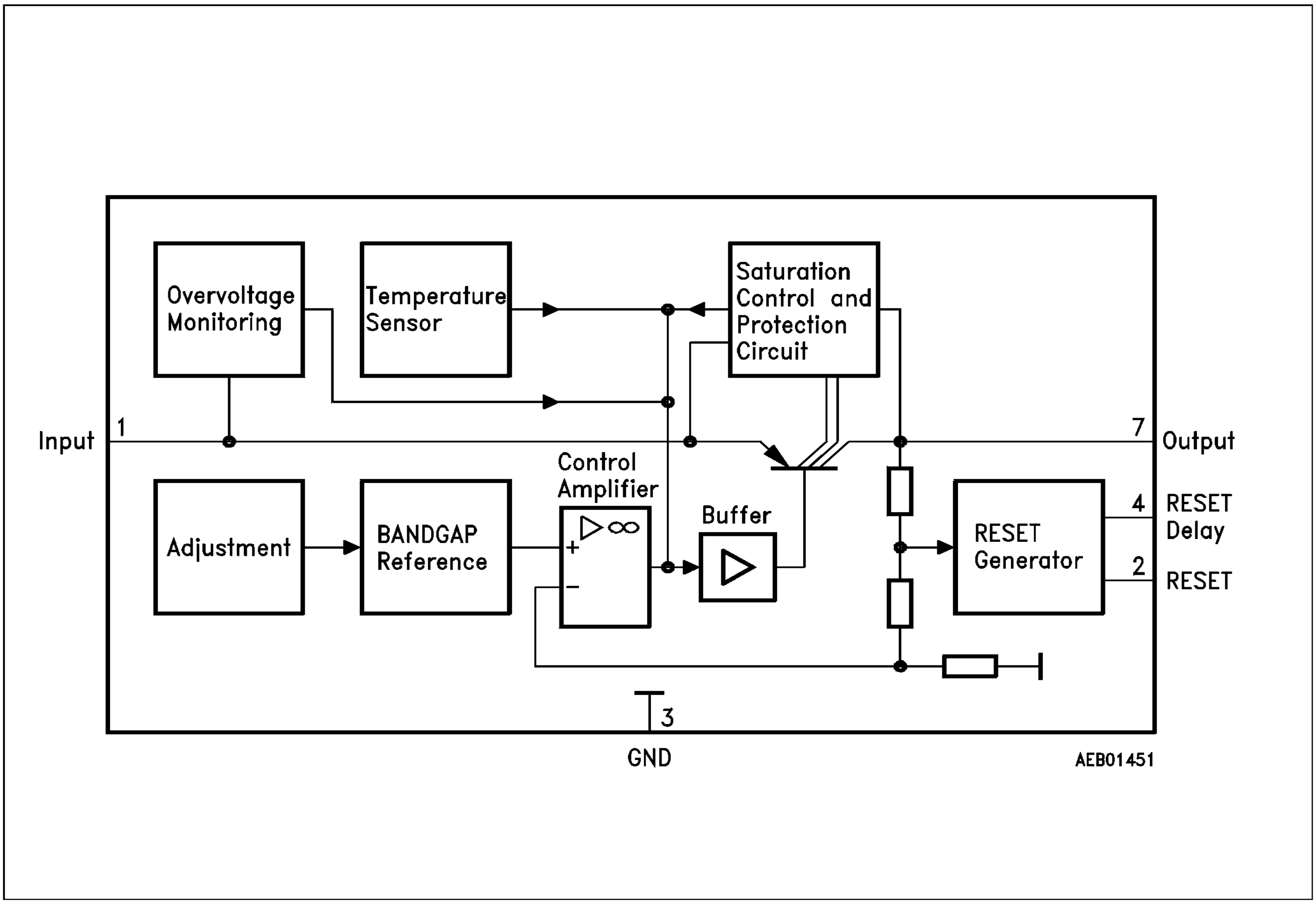
Pin	Symbol	Function
1	V_I	**Input voltage;** block directly to ground on the IC with a 470-nF capacitor
2	QVRES	**Reset output;** open-collector output controlled by the reset delay
3	GND	**Ground**
4	DRES	**Reset delay;** wired to ground with a capacitor
5	V_Q	**5-V output voltage;** block to ground 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.

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	–	60	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)					
Output voltage	V_Q	– 0.3	7	V	–
Current	I_Q	–	1.4	A	–
Temperature					
Junction temperature	T_j	–	150	˚C	–
Storage temperature	T_{stg}	– 50	150	˚C	–
Operating Range					
Input voltage	V_I	5.5	32	V	*)
Junction temperature	T_j	– 40	150	˚C	–
Thermal resistance					
junction-ambient	$R_{th\,JA}$	–	65	K/W	–
junction - case	$R_{th\,JC}$	3		K/W	–

*) **See diagram** "Output Current versus Input Voltage"

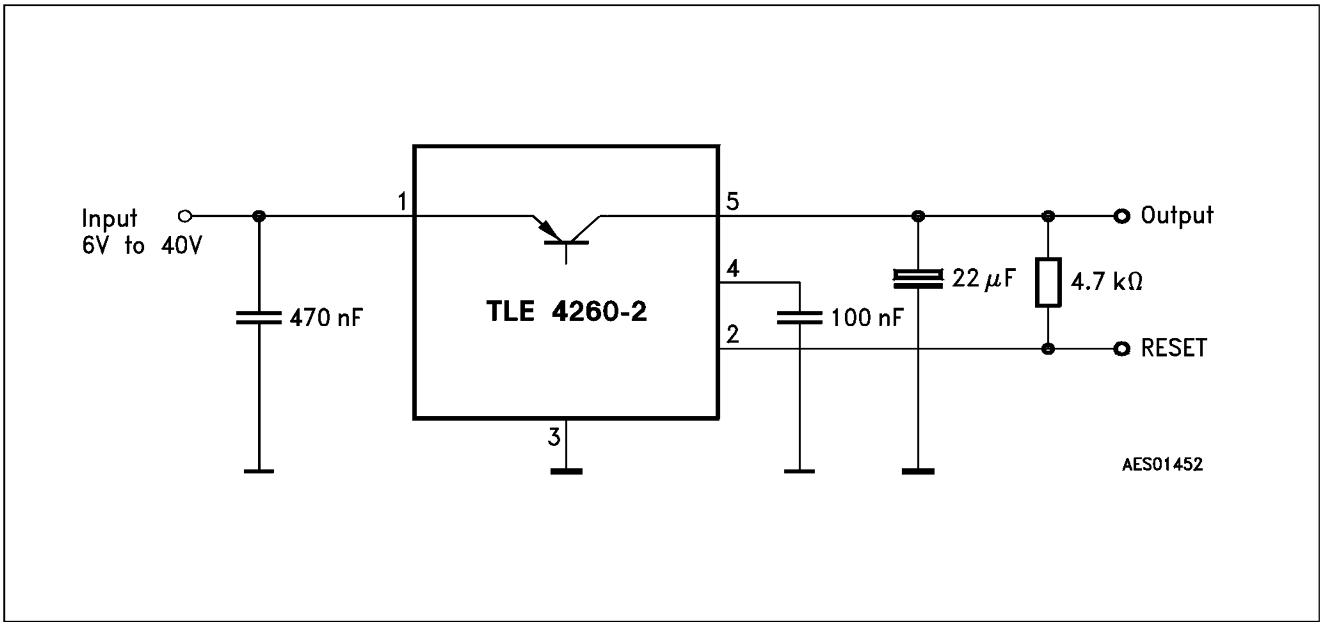
Characteristics
V_I = 13.5 V; T_j = 25 ˚C (unless specified otherwise)

Parameter	Symbol	Limit Values			Unit	Test Condition
		min.	typ.	max.		
Normal Operation						
Output voltage	V_Q	4.95	5.00	5.05	V	I_Q = 250 mA; + 20 ˚C ≤ T_j ≤ 125 ˚C
Output voltage	V_Q	4.90	5.0	5.10	V	I_Q = 250 mA; – 40 ˚C ≤ T_j ≤ + 20 ˚C
Short-circuit current	I_{SC}	500	800	–	mA	V_I = 17 V; V_Q = 0 V
Current consumption; $I_q = I_I - I_Q$	I_q	–	–	2.0	mA	I_Q = 0 mA
Current consumption; $I_q = I_I - I_Q$	I_q	–	8.5	10	mA*)	6 V ≤ V_I ≤ 28 V; I_Q = 150 mA
Current consumption; $I_q = I_I - I_Q$	I_q	–	50	65	mA*)	6 V ≤ V_I ≤ 28 V; I_Q = 500 mA
Current consumption; $I_q = I_I - I_Q$	I_q	–	–	80	mA*)	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	I_Q = 25 mA to 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
Ripplerejection	SVR	–	54	–	dB	f_r = 100 Hz; V_r = 0.5 V_{ss}
Temperature drift of output voltage*)	α_{VQ}	–	2×10^{4}	–	1/˚C	–

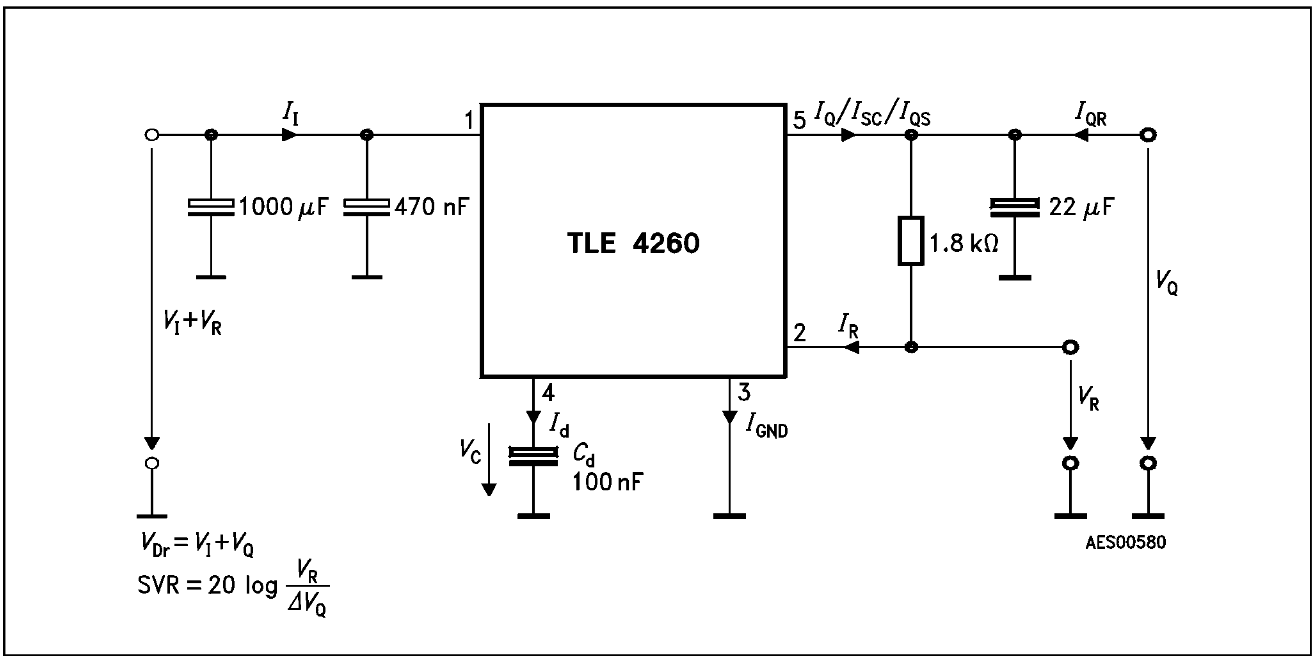
*) **see diagram**

Characteristics (cont'd)
V_I = 13.5 V; T_j = 25 ˚C (unless specified otherwise)

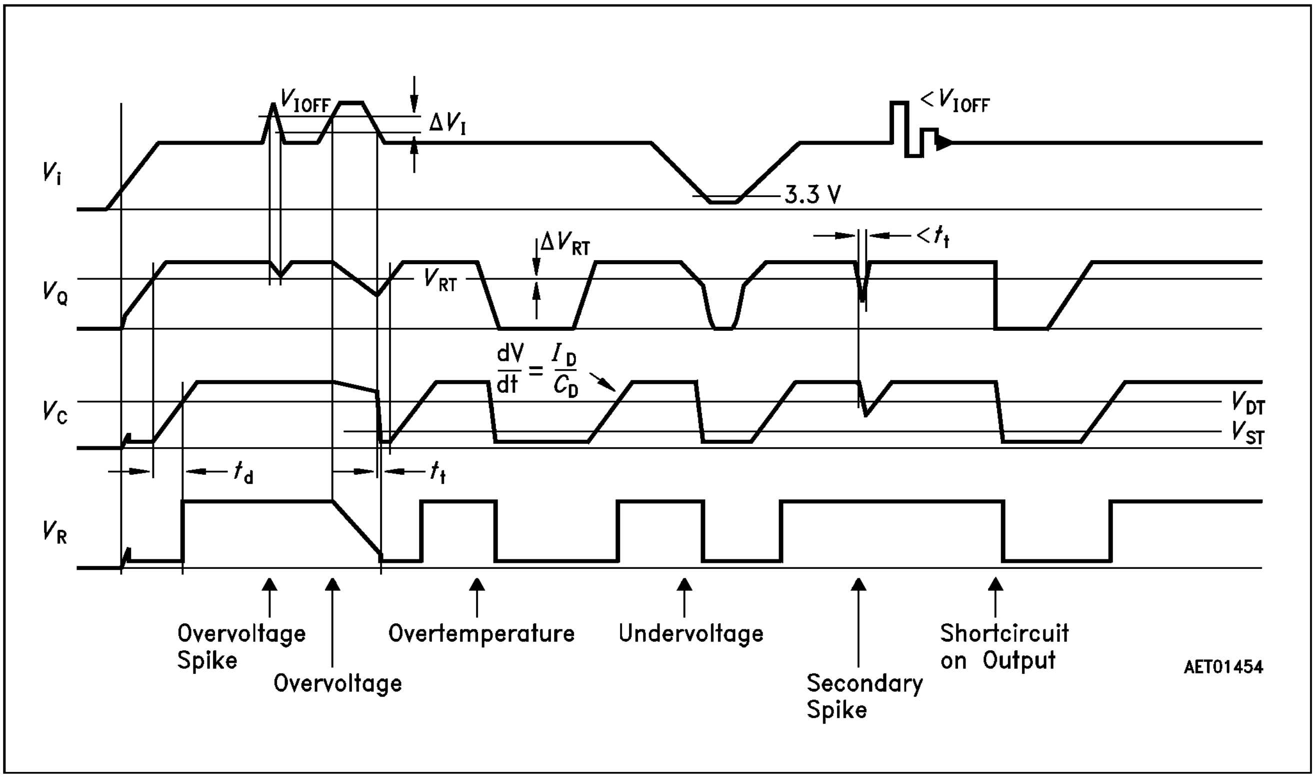
Parameter	Symbol	Limit Values			Unit	Test Condition
		min.	typ.	max.		
Reset Generator						
Switching threshold	V_{RT}	94	96	97	%	in % of V_Q I_Q > 500 mA; V_I = 6 V
Saturation voltage	V_R	–	0.25	0.40	V	R_R = 1.8 k
Saturation voltage	V_C	–	20	100	mV	V_Q < 3 V_{RT}
Reverse current	I_R	–	–	1	µA	V_R = 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	**see diagram**
Delay time	t_t	–	5	–	µs	**see diagram**
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}	–	–	2.5	mA	V_Q = 5 V; V_I = open



Application Circuit

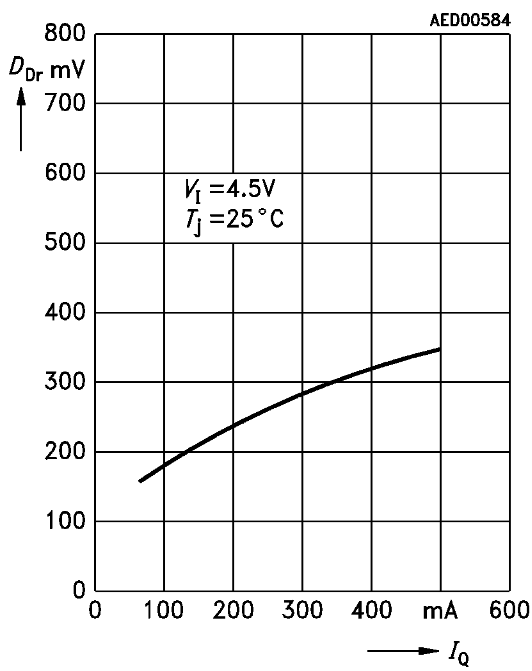


Test Circuit

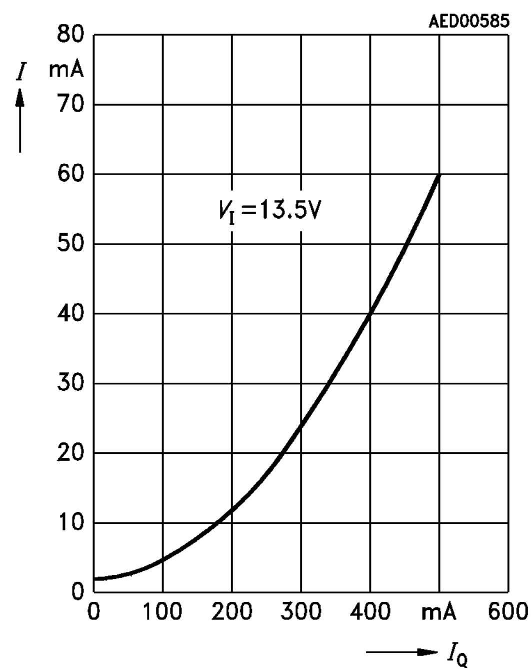


Time Response

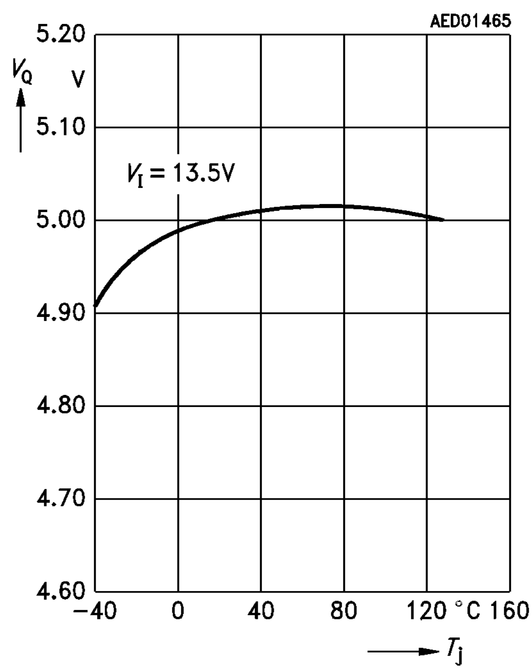
Drop Voltage versus Output Current



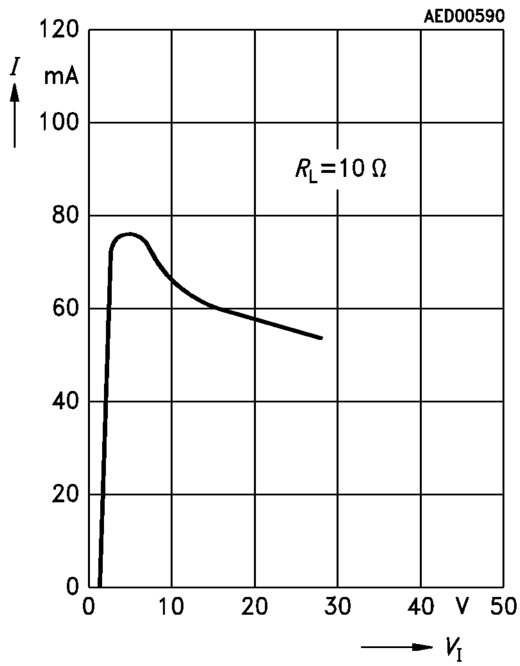
Current Consumption versus Output Current



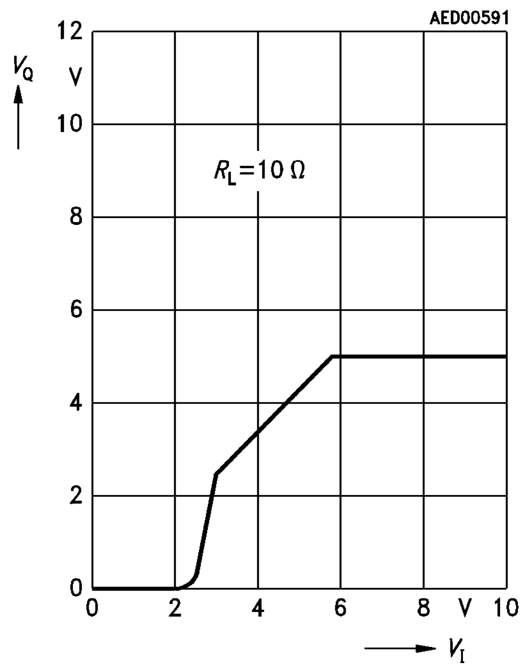
Output Voltage versus Temperature



Current Consumption versus Input Voltage



Output Voltage versus Input Voltage



Output Current versus Input Voltage