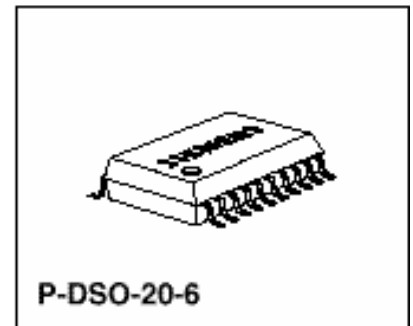
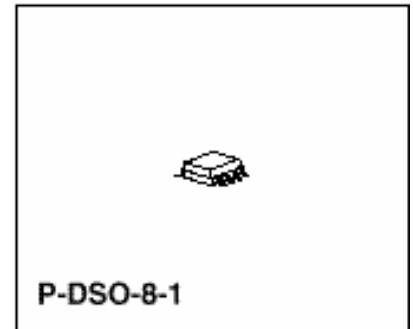


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**5-V Low-Drop Fixed Voltage Regulator****Features**

- Output voltage tolerance  $< \pm 2\%$
- Very low current consumption
- Low-drop voltage
- Watchdog
- Settable reset threshold
- Overtemperature protection
- Reverse polarity protection
- Short-circuit proof
- Suitable for use in automotive electronics
- Wide temperature range

**Type****Ordering Code****Package****Functional Description**

This device is a 5-V low-drop fixed-voltage regulator. The maximum input voltage is 45 V. It can deliver an output current of at least 180 mA. The IC is short-circuit proof and features temperature protection that disables the circuit in the event of impermissibly high temperatures. The watchdog function is disabled as a function of the load, so that a controller is not interrupted during sleep mode by a watchdog reset.

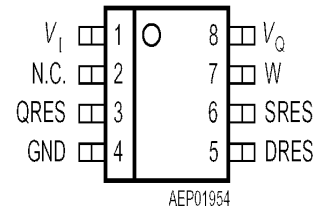
**Application Description**

The IC regulates an input voltage  $V_I$  in the range  $5.5\text{ V} < V_I < 45\text{ V}$  to  $V_{Qrated} = 5.0\text{ V}$ . In the event of an output voltage  $V_Q < V_{RT}$ , a reset signal is generated. The wiring of the reset switching threshold input enables the value of  $V_{RT}$  to be reduced. The reset delay time can be adjusted using an external capacitor. The integrated watchdog monitors the connected active controller. If there is no positive-going edge at the watchdog input, the reset output is set to low. The reset delay capacitor provides a wide adjustment range for the pulse repetition time. The watchdog function is only activated if the load exceeds 8 mA. This ensures that a microcontroller is not activated during power-down and the current drain is not increased. The IC is protected against overload and overtemperature.

# ILE4268

## Pin Definitions and Functions

Pin	Symbol	Function
1	V <sub>I</sub>	Input voltage
2	N.C.	Not connected
3	QRES	Reset output
4	GND	Ground
5	DRES	Reset delay
6	SRES	Reset switching threshold
7	W	Watchdog input
8	V <sub>Q</sub>	5-V output voltage



## Pin Configuration

(top view)

## Pin Definitions and Functions

Pin	Symbol	Function
1,2,8,13, 19,20	N.C.	Not connected.
3	QRES	<b>Reset output</b> ; the open collector output is connected to the 5-V output via an integrated resistor of 30 k $\Omega$ .
4...7, 14... 17	GND	<b>Ground</b>
9	DRES	<b>Reset delay</b> ; connect a capacitor to ground for delay time adjustment.
10	SRES	<b>Reset switching threshold</b> ; for setting the switching threshold, output to ground with voltage divider. If this input is connected to ground, the reset is triggered at an output voltage of 4.5 V.
11	W	<b>Watchdog input</b> ; positive-edge-triggered input for monitoring a microcontroller.
12	V <sub>Q</sub>	<b>5-V output voltage</b> ; block to ground with 22- $\mu$ F capacitor, ESR<30
18	V <sub>i</sub>	<b>Input voltage</b> ; block to ground directly on the 1C with ceramic 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 externally scaled down output voltage at the reset threshold input drops below 1.35 V, the external reset delay capacitor is discharged by the reset generator. If the voltage on the capacitor reaches the lower threshold V<sub>ST</sub>, a reset signal is generated on the reset output and not cancelled again until the upper threshold voltage is exceeded. If the reset threshold input is connected to GND, reset is triggered at an output voltage of 4.5 V. A connected microcontroller is monitored by the watchdog logic. If pulses are missing, the reset output is set to low. The pulse sequence time can be set within a wide range with the reset delay capacitor. The 1C also incorporates a member of internal circuits for protection against:

- Overload
- Overtemperature
- Reverse polarity

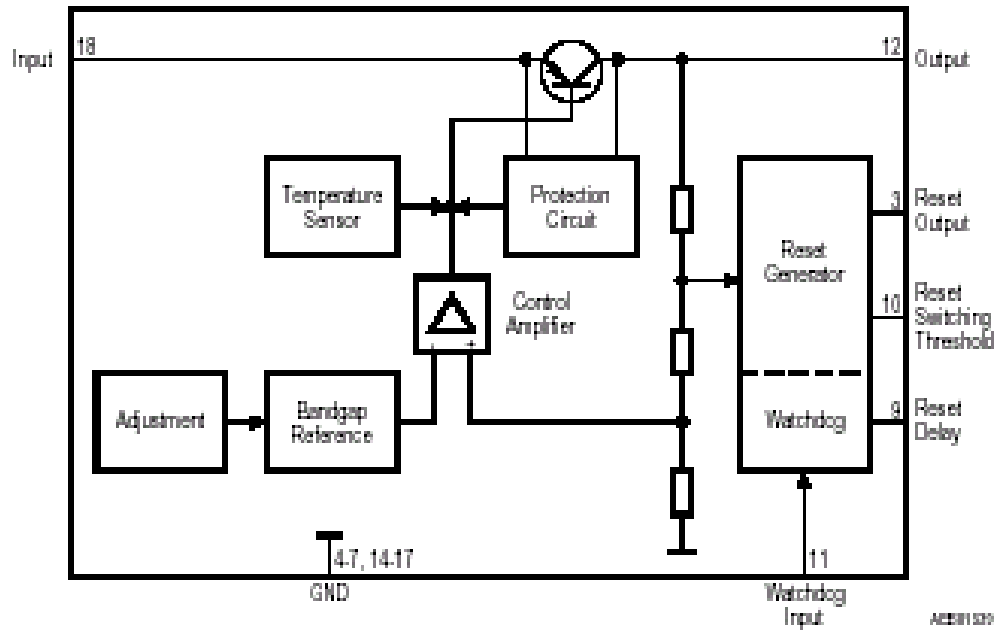


Figure3 Block Diagram

**Absolute Maximum Ratings** Tj=-40 to 150°C

Parameter	Symbol	Limit Values		Unit	Notes
		min.	max.		
<b>Input</b>					
Input voltage	V <sub>i</sub>	-30	45	V	Internally limited
Input current	I <sub>i</sub>				
<b>Reset Output</b>					
Voltage	V <sub>R</sub>	-0.3	7	V	Internally limited
Current	I <sub>R</sub>				
<b>Reset Delay</b>					
Voltage	V <sub>D</sub>	-0.3	7	V	Internally limited
Current	I <sub>D</sub>				
<b>Watchdog</b>					
Watchdog input	V <sub>w</sub>	-0.3	7	V	-
<b>Reset Input</b>					
Reset threshold	V <sub>RE</sub>	-0.3	7	V	-
<b>Output</b>					
Output voltage	V <sub>Q</sub>	-0.3	7	V	Internally limited
Output current	I <sub>Q</sub>				
<b>Ground</b>					
Current	I <sub>M</sub>	-100	50	mA	-
<b>Temperatures</b>					
Junction temperature	T <sub>i</sub>		150	°C	—
Storage temperature	T <sub>s</sub>	-50	150	°C	

**Operating Range**

Parameter	Symbol	Limit Values		Unit	Notes
		min.	max.		

## ILE4268

Input voltage	V <sub>i</sub>	-	45	V	-
Junction temperature	T <sub>j</sub>	-40	150	°C	-
<b>Thermal Resistance</b>					
Junction ambient (soldered)	R <sub>thJA</sub>	—	200	K/W	P-DSO-8-1
	R <sub>thJA</sub>	—	70	K/W	P-DSO-20-6
Junction case	R <sub>thJC</sub>	—	60	KM/ K/W	P-DSO-8-1
	R <sub>thJC</sub>	—	25	K/W	P-DSO-20-6

Optimum reliability and life time are guaranteed if the junction temperature does not exceed 125 °C in operating mode. Operation at up to the maximum junction temperature of 150°C is possible in principle. Note, however, that operation at the maximum permitted ratings could affect the reliability of the device.

### Characteristics

V<sub>i</sub> = 13.5 V; - 40 °C ≤ T<sub>j</sub> ≤ 125 °C (unless otherwise specified)

Parameter	Symbol	Limit Values			Unit	Test Condition
		min.	typ.	max.		
Output voltage	V <sub>Q</sub>	4.90	5.00	5.10	V	5mA ≤ I <sub>Q</sub> ≤ 150mA; 6V ≤ V <sub>i</sub> ≤ 28V;
Output current limiting	I <sub>Q</sub>	180	250	—	mA	—
Current consumption I <sub>q</sub> = I <sub>i</sub> - I <sub>Q</sub>	I <sub>q</sub>	—	300	450	HA	I <sub>Q</sub> = 0 mA
Current consumption I <sub>q</sub> = I <sub>i</sub> - I <sub>Q</sub>	I <sub>q</sub>	—	13	20	mA	I <sub>Q</sub> = 150 mA
Drop voltage	V <sub>DR</sub>	-	0.25	0.5	V	I <sub>Q</sub> = 150mA <sup>1)</sup>
Load regulation	ΔV <sub>Q</sub>	-	10	30	mV	I <sub>Q</sub> = 5 to 150mA
Supply voltage regulation	ΔV <sub>Q</sub>	—	10	30	mV	V <sub>i</sub> = 6 to 28 V I <sub>Q</sub> = 150mA
<b>Reset Generator</b>						
Switching threshold	V <sub>RT</sub>	4.2	4.5	4.8	V	-
Switching voltage	V <sub>RE</sub>	1.28	1.35	1.45	V	-
Saturation voltage	V <sub>R</sub>	-	0.2	0.5	V	1 mA extern
Saturation voltage	V <sub>C</sub>	-	30	100	mV	V <sub>Q</sub> < V <sub>RT</sub>
Charging current	I <sub>d</sub>	5	12	18	μA	V <sub>C</sub> = 1.0V
Delay switching threshold	V <sub>DU</sub>	1.4	1.8	2.2	V	—
Delay time	t <sub>d</sub>	10	15	25	ms	C <sub>d</sub> = 100 nF
Delay time	t <sub>t</sub>	-	2	-	ms	C <sub>d</sub> = 100 nF
Pull-up	R <sub>R</sub>	18	30	46	kΩ	with resp. to V <sub>Q</sub>
Lower switching threshold	V <sub>DRL</sub>	0.2	0.4	0.55	V	—

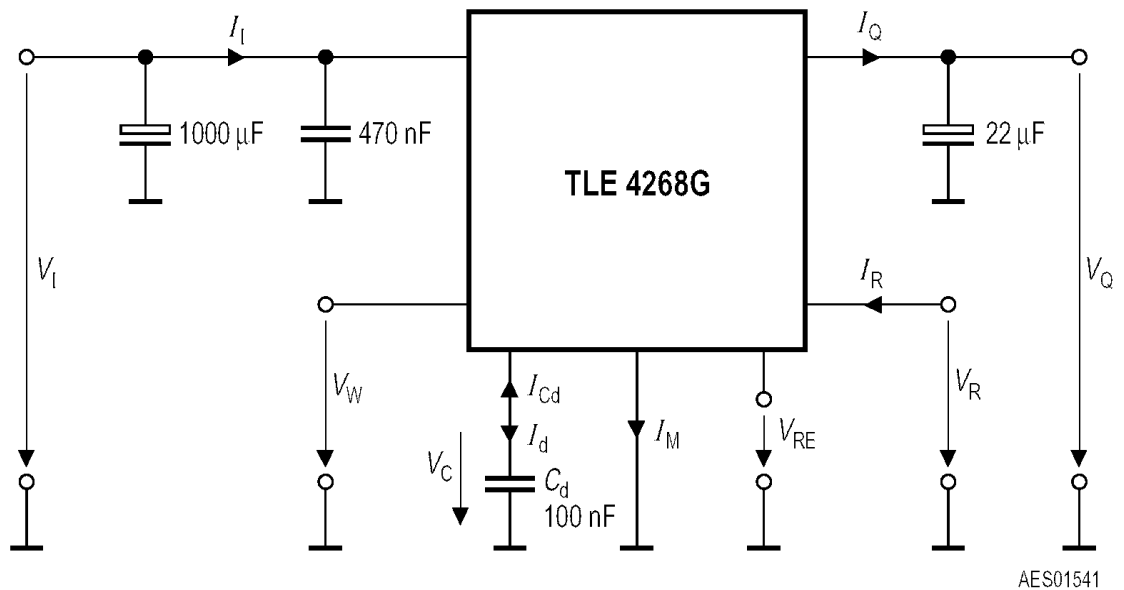
Parameter	Symbol	Limit Values			Unit	Test Condition
		min.	typ.	max.		
<b>Watchdog</b>						
Discharge current	I <sub>Cd</sub>	1.5	3.5	5.2	μA	V <sub>C</sub> = 1.0V

## ILE4268

Charging current	$I_d$	5	12	18	$\mu\text{A}$	$V_c = 1.0\text{V}$
Switching voltage	$V_{Cd}$	1.6	1.8	2.0	V	-
Lower switching threshold	$V_{DWL}$	0.2	0.4	0.55	V	—
Watchdog periode	$T_{WP}$	30	55	75	ms	$Q = 100\text{nF}$
Watchdog trigger time	$F_{WT}$	25	40	60	ms	$C_d = 100\text{nF}$
Activating current	$I_Q$	2	8	15	mA	Activates watchdog
Slew rate	$V_w$	5	—	—	$\text{V}/\mu\text{s}$	from 20 % up to 80 % $v_Q$

Note: The reset output is low in range from  $V_Q = 1\text{ V}$  to  $V_{RT}$ .

<sup>1</sup> Drop voltage =  $V_I - V_Q$  (measured when the output voltage has dropped 100 mV from the nominal value obtained at 13.5 V input)



$V_{Dr} = V_I - V_Q$  Outside the control range

**Figure 4 Test Circuit**

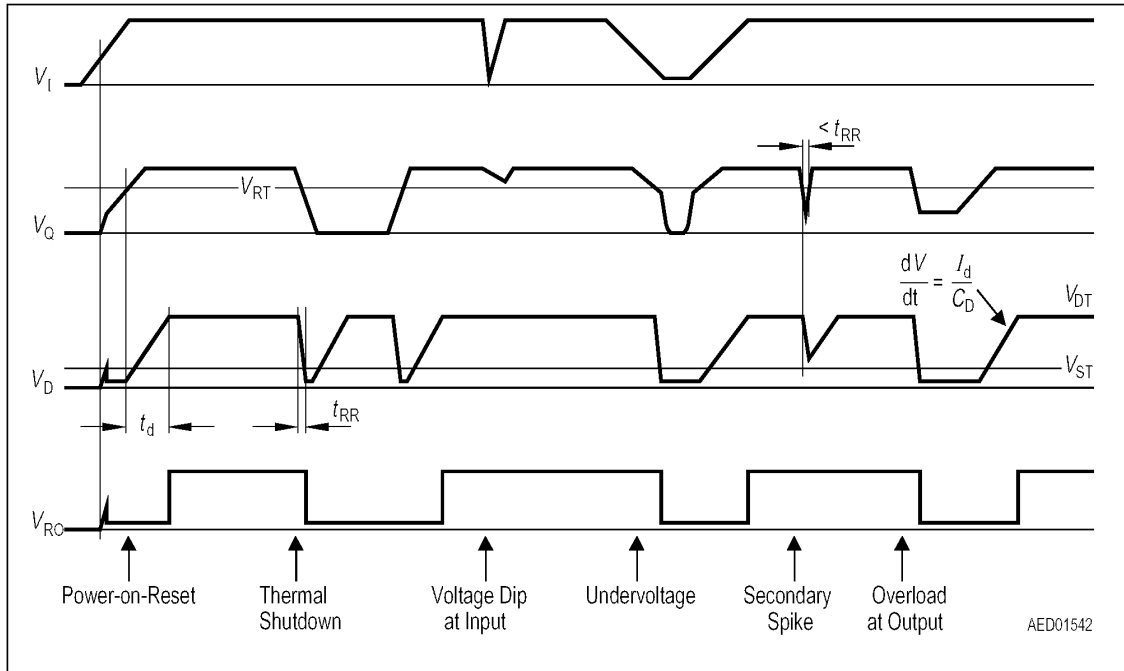


Figure 5 Timing of the Watchdog Function

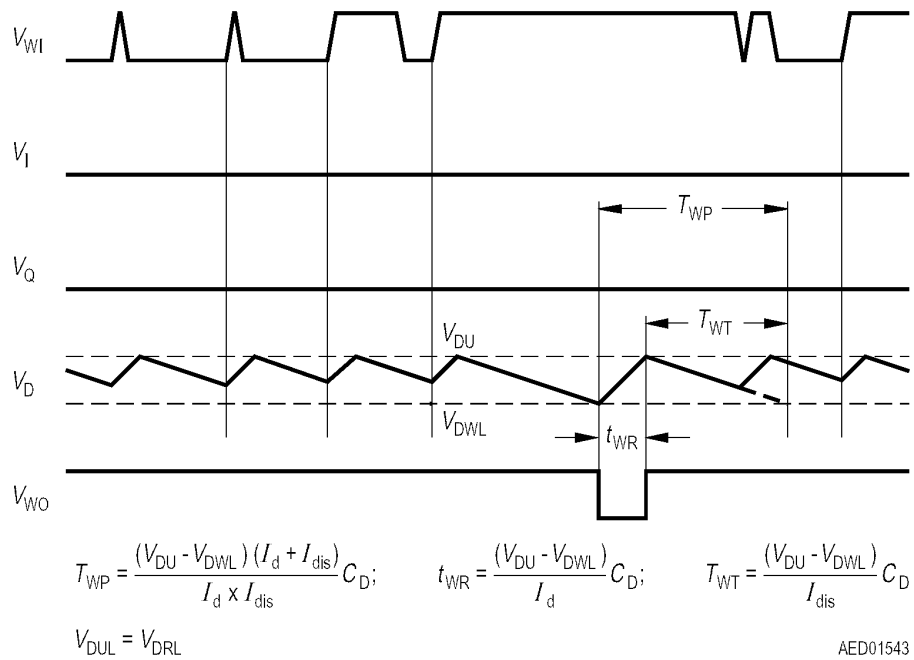


Figure 6 Timing of the Watchdog Function