

## Single-Channel Driver with Thermal Monitoring

### Description

The single-channel driver IC includes one non-inverted and current-limited output stage with an open collector. Thermal shutdown protects the output against critical

junction temperatures. The output can sink a current of 20 mA. The digital input has Schmitt-trigger function with pull-up resistors to 5 V.

### Features

- Input comparator with Schmitt-trigger characteristic
- Input clamping current capability of  $\pm 10$  mA
- Integrated protection cells (EMC, ESD, RF) dedicated to all input stages
- Shutdown by junction-temperature monitor
- Reset with hysteresis at low voltage
- ESD protection according to human body model:  $\pm 2000$  V ( $C = 100$  pF,  $R = 1.5$  k $\Omega$ )
- Output stage:
  - Short-circuit protected
  - Load-dump protected @ 1 k $\Omega$
  - Jump start possible

### Block Diagram / Applications

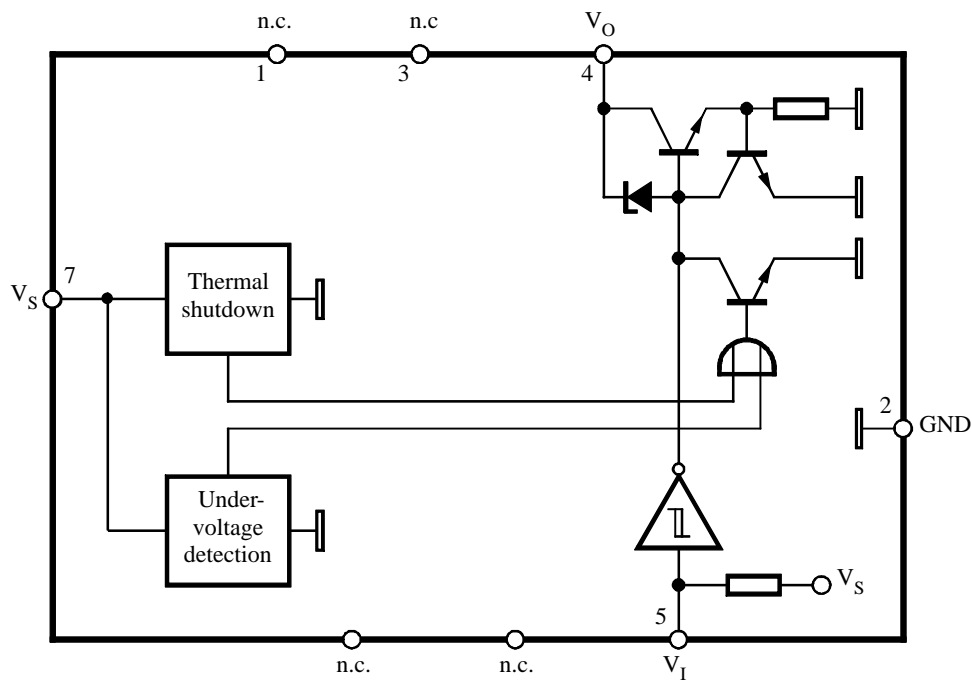


Figure 1. Block diagram / applications

### Ordering Information

Extended Type Number	Package	Remarks
T6801-TAQ	SO8	

## Pin Configuration

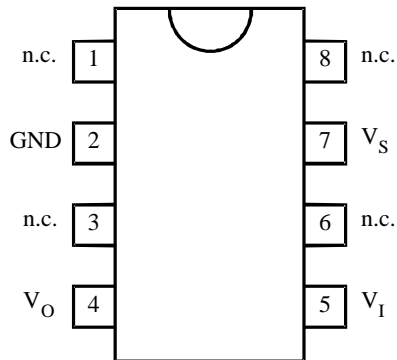


Figure 2. Pinning

Pin	Symbol	Function
1	n.c.	Not connected
2	GND	Ground
3	n.c.	Not connected
4	V <sub>O</sub>	Output
5	V <sub>I</sub>	Input
6	n.c.	Not connected
7	V <sub>S</sub>	Supply voltage 5 V
8	n.c.	Not connected

## Basic Circuitry

The integrated circuit T6801 requires a stabilized supply voltage ( $V_S = 5 \text{ V} \pm 5\%$ ) to comply with its electrical characteristics. An external buffer capacitor of  $C = 100 \text{ nF}$  value is recommended. An integrated 14-V Zener diode between  $V_S$  and ground protects the supply pin.

The input stage is provided with an integrated 250-k $\Omega$  pull-up resistor and can be directly connected to a microcontroller.

The output stage is an open collector – capable of sinking 20 mA. Recommended external components:

- Pull-up resistor,  $R = 1 \text{ k}\Omega$
- Capacitor to GND,  $C = 470 \text{ pF}$ , see figure 3

## Functional Description

### General

**ON state:** Low level at the input stage activates the output stage.

**OFF state:** The internal pull-up resistor provides high level to the input comparator and deactivates the output stage.

A 7-V Zener diode between input pin and GND is capable of  $\pm 10 \text{ mA}$  clamping current.

## Current Limitation of the Output Stages and Overtemperature Shut-down

A temperature-dependent current limitation in the range of 25 to 100 mA protects the stage in case of a short. Additionally, the chip temperature is monitored. For  $T_{\text{chip}} > 148^\circ\text{C}$ , the output is disabled and automatically enabled with a hysteresis of  $T_{\text{chip}} > 5^\circ\text{C}$ .

## Transients and Load Dump

An integrated 28-V Zener diode protects the output stage against transients and load-dump (Schaffner pulses). With the help of external 1-k $\Omega$  resistor, the output transistor is capable to handle the corresponding current which flows during each of these conditions. Apart from that, the output is short circuit and overload protected.

## Low-Voltage Detection

When the supply voltage is switched on, a power-on reset pulse is generated internally which disables the output stage until a defined supply-voltage level is reached. The low-voltage detection is provided with a hysteresis of  $V_{\text{hyst}} = 0.5 \text{ V}$  typically.

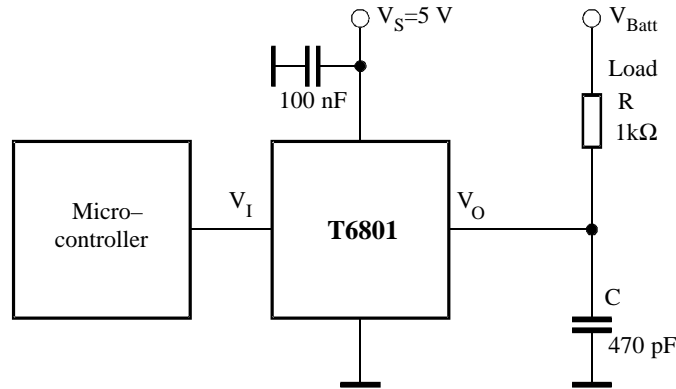


Figure 3. Application schematic

## Absolute Maximum Ratings

Parameters	Symbol	Value	Unit
Supply voltage	$V_S$	7.0	V
Ambient temperature range	$T_{amb}$	-40 to +125	°C
Storage temperature range	$T_{stg}$	-50 to +150	°C
Maximum junction temperature	$T_j$	+150	°C

## Thermal Resistance

Parameters	Symbol	Value	Unit
Junction ambient	$R_{thJA}$	160	K/W

## Electrical Characteristics

$V_S = 5\text{ V} \pm 5\%$ ,  $T_{amb} = 27^\circ\text{C}$ , reference point pin 2 (GND), unless otherwise specified, see figures 1 and 3.

Parameters	Test Conditions / Pins	Symbol	Min.	Typ.	Max.	Unit
<b>Supply Pin 7</b>						
Supply voltage		$V_S$	4.75		5.25	V
Supply current	Input open	$I_S$	0.8		3.2	mA
	Input closed to GND	$I_S$	7		13	mA
Low-voltage detection threshold:	ON	$V_{TH(ON)}$	3.7		4.6	V
	OFF	$V_{TH(OFF)}$	3.0		3.8	V
Low-voltage hysteresis		$V_{hyst}$	0.55		1.05	V
Temperature shutdown		$T_{Chip}$	140		149	°C
Temperature shutdown hysteresis		$T_{hyst}$	5			°C

## Electrical Characteristics (continued)

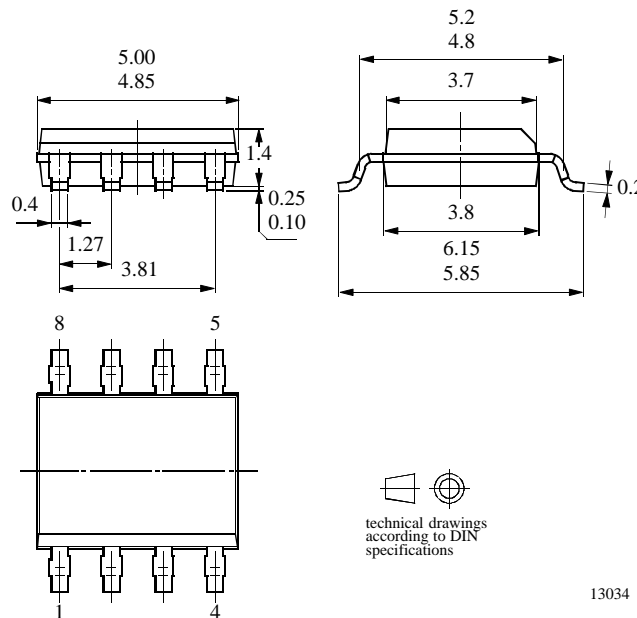
$V_S = 5\text{ V} \pm 5\%$ ,  $T_{\text{amb}} = 27^\circ\text{C}$ , reference point pin 2 (GND), unless otherwise specified, see figures 1 and 3.

Parameters	Test Conditions / Pins	Symbol	Min.	Typ.	Max.	Unit
<b>Input Pin 5</b>						
Zener-diode protection voltage	$I_I = 10\text{ mA}$	$V_I$	6.7		8.5	V
Zener-diode clamping current		$I_I$			$\pm 10$	mA
Pull-up resistor		$R_I$	170	250	305	k $\Omega$
Switching threshold	OFF ON	$V_I$ $V_I$		3.3 1.8		V V
Hysteresis		$V_{\text{hyst}}$		1.5		V
<b>Output Pin 4</b>						
Zener-diode protection voltage	$I_O = 10\text{ mA}$	$V_O$	26.5			V
Integrated capacitor				5		pF
Leakage current		$I_{\text{Leak}}$			2.5	$\mu\text{A}$
Saturation voltage	( $I_O = 20\text{ mA}$ )	$V_{\text{Sat}}$			0.7	V
Current limitation		$I_{\text{limit}}$	25		100	mA
Propagation delay	(470 pF, 1 k $\Omega$ , 20 V)	$t_d$			5	$\mu\text{s}$

## Package Information

Package SO8

Dimensions in mm



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1. Meet all present and future national and international statutory requirements.
2. Regularly and continuously improve the performance of our products, processes, distribution and operating systems with respect to their impact on the health and safety of our employees and the public, as well as their impact on the environment.

It is particular concern to control or eliminate releases of those substances into the atmosphere which are known as ozone depleting substances (ODSs).

The Montreal Protocol (1987) and its London Amendments (1990) intend to severely restrict the use of ODSs and forbid their use within the next ten years. Various national and international initiatives are pressing for an earlier ban on these substances.

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1. Annex A, B and list of transitional substances of the Montreal Protocol and the London Amendments respectively
2. Class I and II ozone depleting substances in the Clean Air Act Amendments of 1990 by the Environmental Protection Agency (EPA) in the USA
3. Council Decision 88/540/EEC and 91/690/EEC Annex A, B and C (transitional substances) respectively.

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