Single-Channel Driver with Thermal Monitoring

Description

The singel-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 acording to human body model: $\pm$ 2000 V (C = 100 pF, R = 1.5 kΩ)

- Output stage:

- Short-circuit protected

- Load-dump protected @ 1 kΩ

- Jump start possible
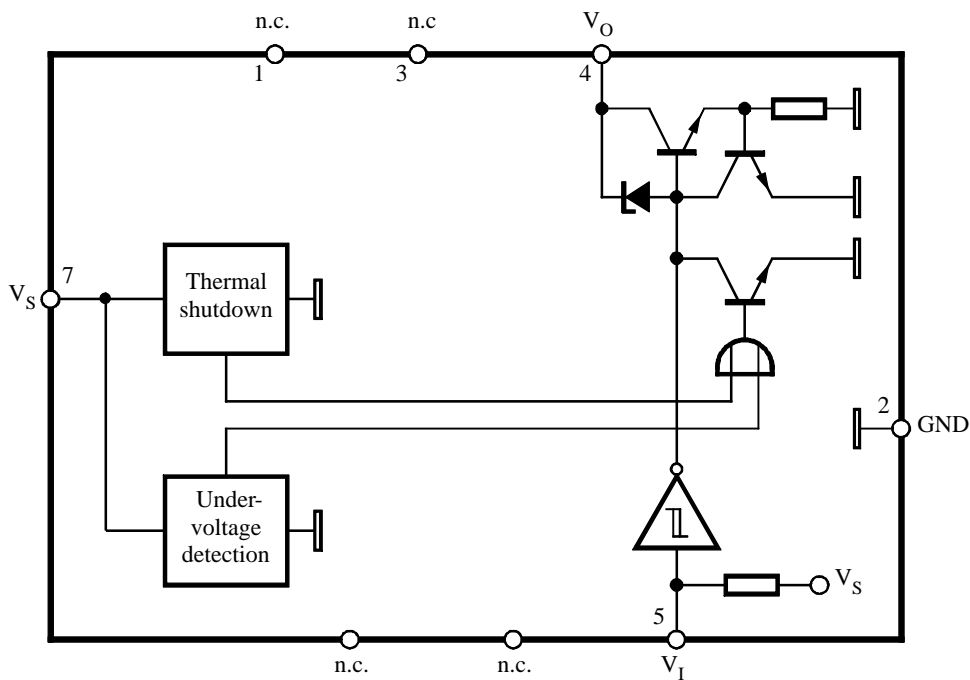
Block Diagram / Applications

Figure 1. Block diagram / applications

Ordering Information
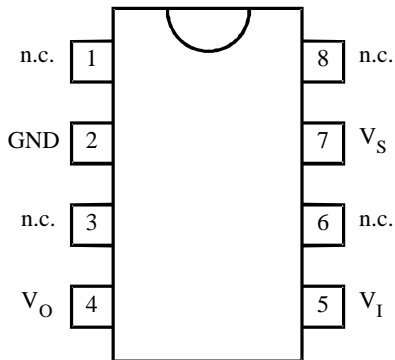
Extended Type Number	Package	Remarks
T6801–TAQ	SO8	

T6801

Pin Configuration

Pin	Symbol	Function
1	n.c.	Not connected
2	GND	Ground
3	n.c.	Not connected
4	V_O	Output
5	V_I	Input
6	n.c.	Not connected
7	V_S	Supply voltage 5 V
8	n.c.	Not connected

Figure 2. Pinning

Basic Circuitry

The integrated circuit T6801 requires a stabilized supply voltage ($V_S = 5$ V $\pm 5\%$) to comply with its electrical characteristics. An external buffer capacitor of C = 100 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-kΩ 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 kΩ
> Capacitor to GND, C = 470 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 ± 10 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_{chip} > 148°C, the output is disabled and automatically enabled with a hysteresis of T_{Chip} > 5°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-kΩ 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 $V_{hyst} = 0.5$ V typically.

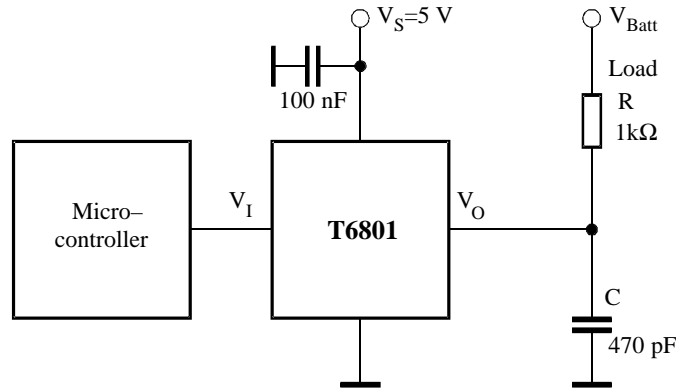Figure 3. Application schematic

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

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

| Parameters	Test Conditions / Pins	Symbol	Min.	Typ.	Max.	Unit
Supply Pin 7						
Supply voltage		V_S	4.75		5.25	V
Supply current	Input open Input closed to GND	I_S I_S	0.8 7		3.2 13	mA mA
Low-voltage detection threshold:	ON OFF	$V_{TH(ON)}$ $V_{TH(OFF)}$	3.7 3.0		4.6 3.8	V 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)

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

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

Package Information

Package SO8
Dimensions in mm

technical drawings
according to DIN
specifications

13034
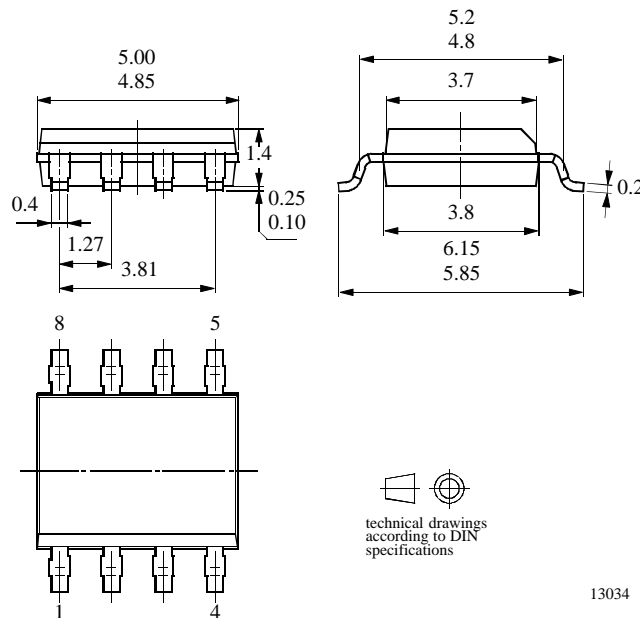
Ozone Depleting Substances Policy Statement

It is the policy of **Atmel Germany GmbH** to

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.

Atmel Germany GmbH has been able to use its policy of continuous improvements to eliminate the use of ODSs listed in the following documents.

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.

Atmel Germany GmbH can certify that our semiconductors are not manufactured with ozone depleting substances and do not contain such substances.

Data sheets can also be retrieved from the Internet: **http://www.atmel–wm.com**

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