

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 ± 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: ± 2000 V ($C = 100$ pF, $R = 1.5$ k Ω)
- Output stage:
 - Short-circuit protected
 - Load-dump protected @ 1 k Ω
 - Jump start possible

Ordering Information

Extended Type Number	Package	Remarks
U6801B-FP	SO8	

Block Diagram / Applications

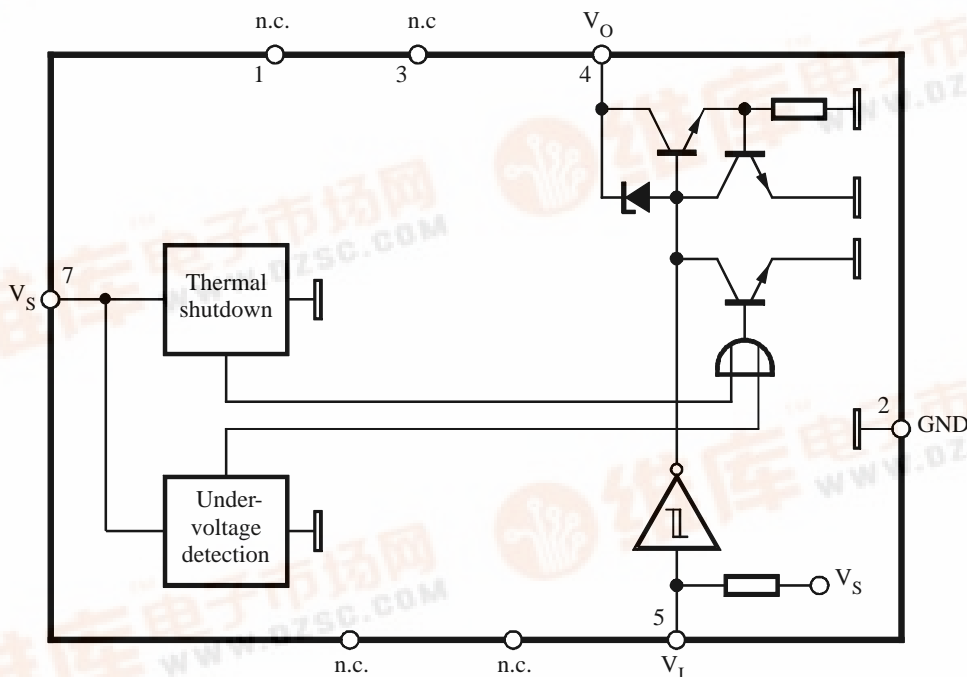


Figure 1.

Pin Configuration

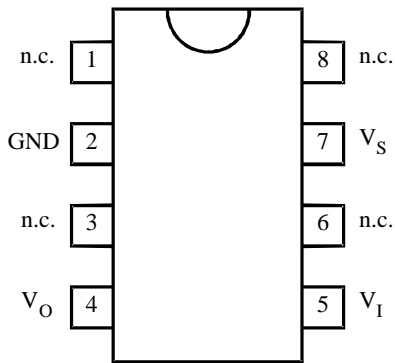


Figure 2. Pinning

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

Basic Circuitry

The integrated circuit U6801B 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 Ω 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 Ω 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.

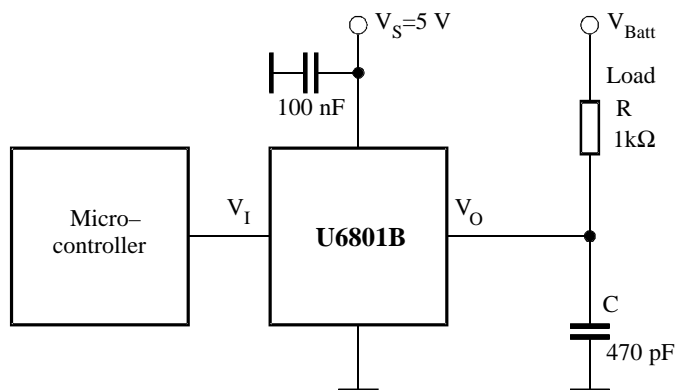


Figure 3. Application schematic

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

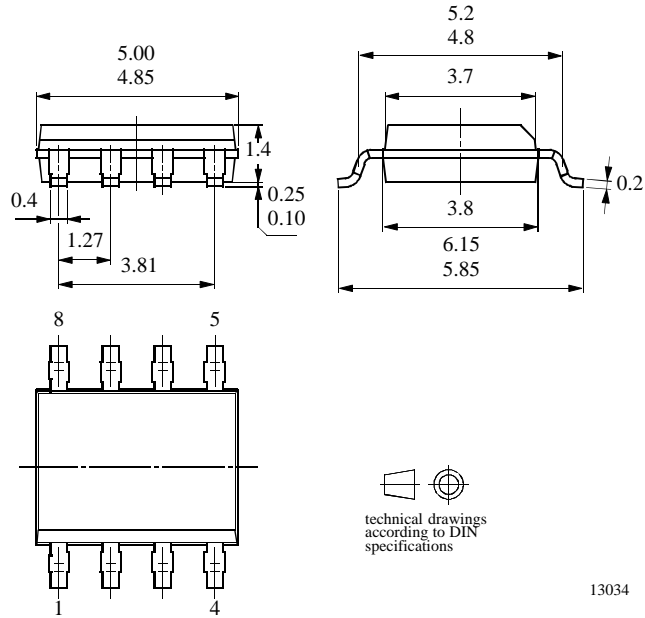
Electrical Characteristics

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

Parameters	Test Conditions / Pins	Symbol	Min.	Typ.	Max.	Unit
Supply Pin 7						
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	$V_{\text{TH(ON)}}$	3.7		4.6	V
	OFF	$V_{\text{TH(OFF)}}$	3.0		3.8	V
Low-voltage hysteresis		V_{hyst}	0.55		1.05	V
Temperature shutdown		T_{Chip}	140		149	$^\circ\text{C}$
Temperature shutdown hysteresis		T_{hyst}	5			$^\circ\text{C}$
Input Pin 5						
Zener-diode protection voltage	$I_I = 10\text{ mA}$	V_I	6.7		8.5	V
Zener-diode clamping current		I_I			± 10	mA
Pull-up resistor		R_I	170	250	305	k Ω
Switching threshold	OFF	V_I		3.3		V
	ON	V_I		1.8		V
Hysteresis		V_{hyst}		1.5		V
Output Pin 4						
Zener-diode protection voltage	$I_O = 10\text{ mA}$	V_O	26.5			V
Integrated capacitor				5		pF
Leakage current		I_{Leak}			2.5	μA
Saturation voltage	($I_O = 20\text{ mA}$)	V_{Sat}			0.7	V
Current limitation		I_{limit}	25		100	mA
Propagation delay	(470 pF, 1 k Ω , 20 V)	t_d			5	μs

Package Information

Package SO8
Dimensions in mm



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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.

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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
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