

Hex Driver with Thermal Monitoring

Description

The hex driver IC includes 6 non-inverted and current-limited output stages with an open collector. Common thermal shutdown protects outputs against critical junction temperature.

Each output can sink a current of 20 mA, parallel output operation is possible. The digital inputs have Schmitt-trigger function with pull-up resistors to 5 V.

Features

- Six input comparators with Schmitt-trigger characteristic
- Input clamping current capability of ± 10 mA
- Integrated protection cells (EMC, ESD, RF) dedicated to all input stages
- Common 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 stages:
 - Short-circuit protected
 - Load-dump protected @ 1 k Ω
 - No crosstalk on adjacent channels
 - Jump start possible

Block Diagram

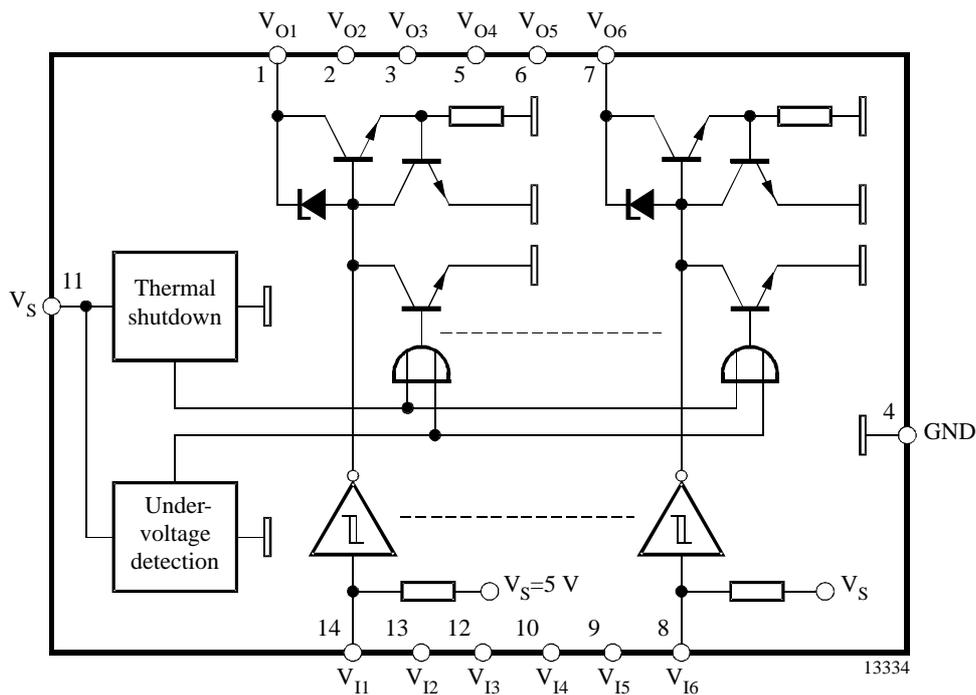


Figure 1. Block diagram

Ordering Information

Extended Type Number	Package	Remarks
U6805B-FP	SO14	

Pin Description

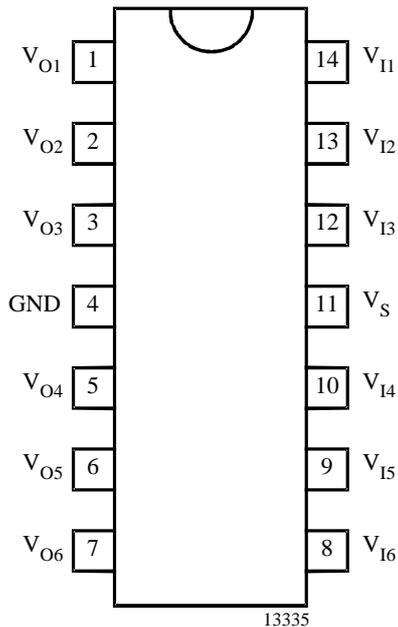


Figure 2. Pinning

Pin	Symbol	Function
1	V _{O1}	Output 1
2	V _{O2}	Output 2
3	V _{O3}	Output 3
4	GND	Ground
5	V _{O4}	Output 4
6	V _{O5}	Output 5
7	V _{O6}	Output 6
8	V _{I6}	Input 6
9	V _{I5}	Input 5
10	V _{I4}	Input 4
11	V _S	Supply voltage, 5 V
12	V _{I3}	Input 3
13	V _{I2}	Input 2
14	V _{I1}	Input 1

Basic Circuitry

The integrated circuit U6805B 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 Z diode between V_S and ground protects the supply pin.

All input stages are provided with an integrated 250-k Ω pull-up resistor and can be directly connected to a microcontroller.

All output stages are open collectors – each 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 corresponding output stage.

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

7-V Z diodes between each input pin and GND are capable of $\pm 10 \text{ mA}$ clamping currents without crosstalk on adjacent input stages.

A total clamping current of $\pm 30 \text{ mA}$ should be observed with respect to the power dissipation.

Current Limitation of the Output Stages and Overtemperature Shutdown

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

Refer to hex driver U6807B if the temperature shutdown is not required.

Transients and Load Dump

An integrated 28-V Z diode protects each 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, outputs are 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 all output stages 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.

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}	120	K/W

Electrical Characteristics

$V_S = 5\text{ V} \pm 5\%$, $T_{amb} = 27^\circ\text{C}$, reference point pin 4 (GND), unless otherwise specified, see figure 1.

Parameters	Test Conditions / Pins	Symbol	Min.	Typ.	Max.	Unit
Supply Pin 11						
Supply voltage		V_S	4.75		5.25	V
Supply current	Inputs open	I_S	0.8		3.2	mA
	Inputs 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
Inputs Pins 8, 9, 10, 12, 13 and 14						
Z diode protection voltage	$I_I = 10\text{ mA}$	V_I	6.7		8.5	V
Z 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
Outputs Pins 1, 2, 3, 5, 6 and 7						
Z 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

Application Circuit

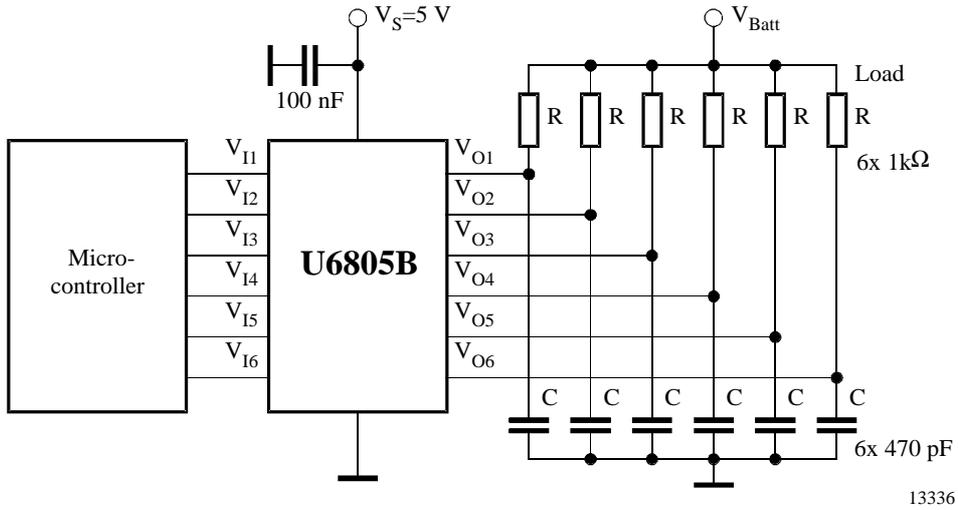
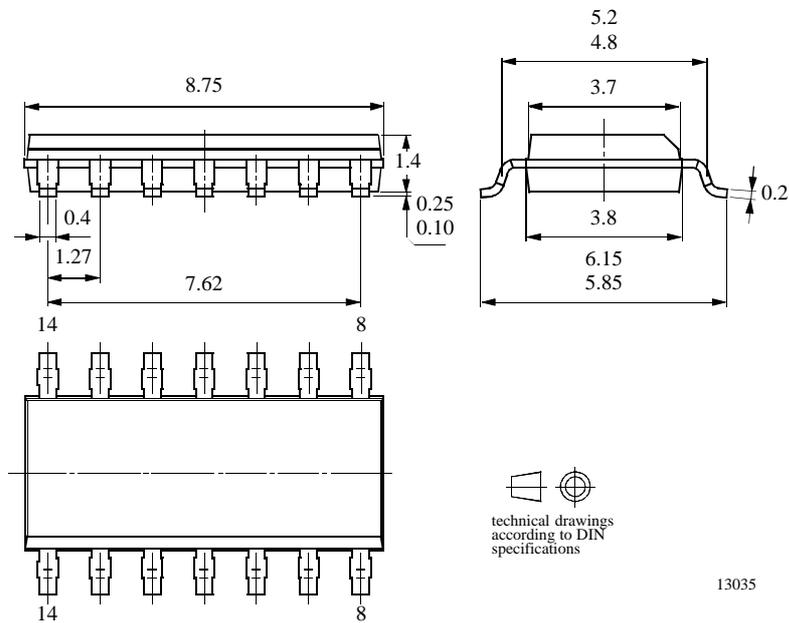


Figure 3. Application schematic

Package Information

Package SO14
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.

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.

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Data sheets can also be retrieved from the Internet: <http://www.atmel-wm.com>

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