

## 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 20 mA, parallel output operation is possible. The digital inputs have Schmitt-trigger function with pull-up current sources to 5 V.

### Features

- Six input comparators with Schmitt-trigger characteristic
- Input clamping current capability to  $\pm 10$  mA
- Integrated protection cells (EMC, ESD, RF) dedicated to all input stages
- Common shutdown by junction temperature monitor
- Low voltage reset with hysteresis
- ESD protection to human body model:  $\pm 2000$  V ( $C = 100$  pF,  $R = 1.5$  k $\Omega$ )
- Output stages:
  - Short circuit protected with diode
  - Load-dump protected @ 1 k $\Omega$
  - No crosstalk on adjacent channels
  - Clamping current @  $-2$  mA
  - Jump start possible

### Ordering Information

| Extended Type Number | Package | Remarks |
|----------------------|---------|---------|
| U6805B-FP            | SO14    |         |

### Block Diagram

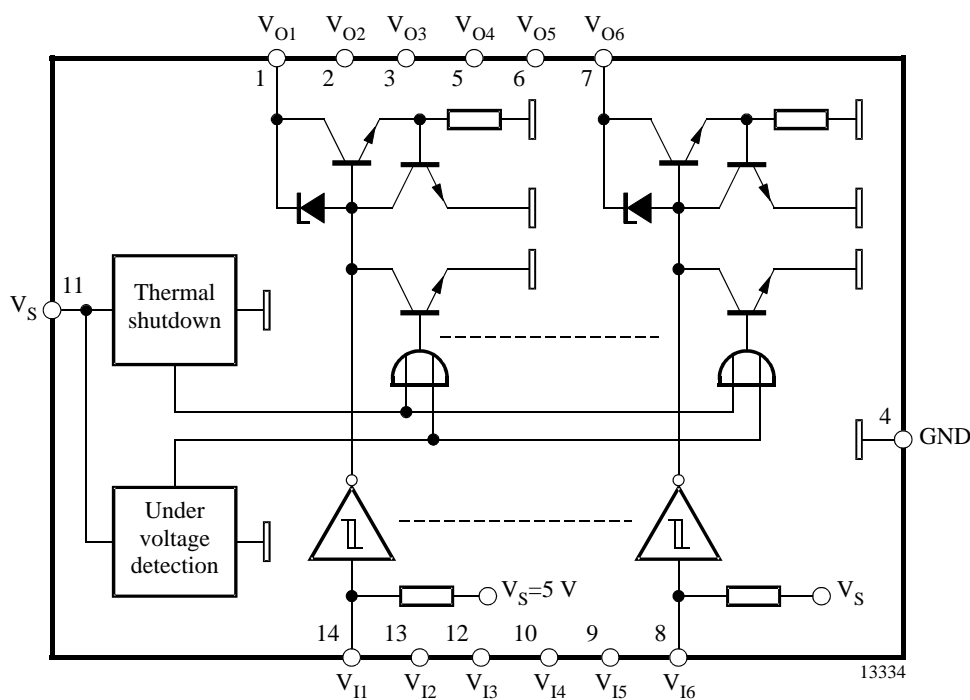


Figure 1.

## Pin Description

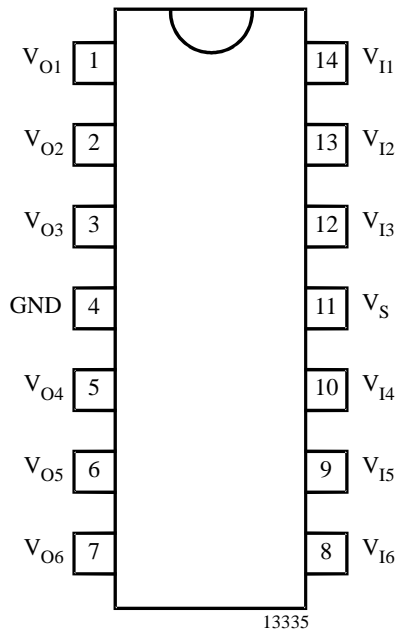


Figure 2. Pinning

| Pin | Symbol          | Function            |
|-----|-----------------|---------------------|
| 1   | V <sub>O1</sub> | Output 1            |
| 2   | V <sub>O2</sub> | Output 2            |
| 3   | V <sub>O3</sub> | Output 3            |
| 4   | GND             | Ground              |
| 5   | V <sub>O4</sub> | Output 4            |
| 6   | V <sub>O5</sub> | Output 5            |
| 7   | V <sub>O6</sub> | Output 6            |
| 8   | V <sub>I6</sub> | Input 6             |
| 9   | V <sub>I5</sub> | Input 5             |
| 10  | V <sub>I4</sub> | Input 4             |
| 11  | V <sub>S</sub>  | Supply voltage, 5 V |
| 12  | V <sub>I3</sub> | Input 3             |
| 13  | V <sub>I2</sub> | Input 2             |
| 14  | V <sub>I1</sub> | Input 1             |

## Basic Circuitry

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 $\Omega$  pull-up resistor and can be directly connected to a micro-controller.

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 gives 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 Shut-down

A temperature dependent current limitation between 25 and 100 mA protects the stages during 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 hexdriver U6807B if the temperature shut down 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 $\Omega$  resistor, the output transistor is capable of the corresponding current which flows during each of these conditions. Apart from that, outputs are short circuit and overload protected.

## Low Voltage Detection

When 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

$V_S = 5\text{ V} \pm 5\%$ ,  $T_{amb} = 25^\circ\text{C}$ , reference point pin 4 (GND), unless otherwise specified, see figure 1.

| Parameters                                      | Test Conditions / Pins | Symbol        | Min. | Typ. | Max.     | Unit          |
|---|------------------------|---------------|------|------|----------|---------------|
| <b>Supply Pin 11</b>                            |                        |               |      |      |          |               |
| 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 shut down                           |                        | $T_{Chip}$    | 140  |      | 149      | °C            |
| Temperature shut-down hysteresis                |                        | $T_{hyst}$    | 5    |      |          | °C            |
| <b>Inputs Pins 8, 9, 10, 12, 13 and 14</b>      |                        |               |      |      |          |               |
| Z-diode protection voltage                      |                        | $V_I$         | 6.7  |      | 8.5      | V             |
| Z-diode clamping current                        |                        | $I_I$         |      |      | $\pm 10$ | mA            |
| Pull-up resistor                                |                        | $R_I$         | 170  | 250  | 305      | k $\Omega$    |
| Switching threshold                             | OFF                    | $V_I$         |      | 3.3  |          | V             |
|   | ON                     | $V_I$         |      | 1.8  |          | V             |
| Hysteresis                                      |                        | $V_{hyst}$    |      | 1.5  |          | V             |
| <b>Outputs Pins 1, 2, 3, 5, 6 and 7</b>         |                        |               |      |      |          |               |
| Z-diode protection voltage                      |                        | $V_O$         | 26.5 |      |          | V             |
| Integrated capacitor                            |                        |               |      | 5    |          | pF            |
| Leakage current                                 |                        | $I_{Leak}$    |      |      | 2.5      | $\mu\text{A}$ |
| Saturation voltage ( $I = 20\text{ mA}$ )       |                        | $V_{Sat}$     |      |      | 0.7      | V             |
| Current limitation                              |                        | $I_{limit}$   | 25   |      |          | mA            |
| Propagation delay (470 pF, 1 k $\Omega$ , 20 V) |                        | $t_d$         |      |      | 5        | $\mu\text{s}$ |

## Application Circuit

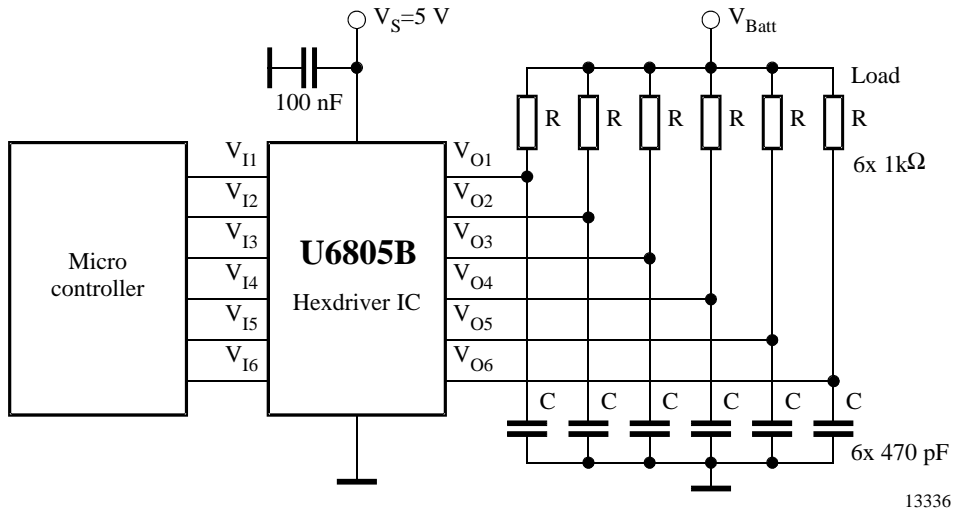
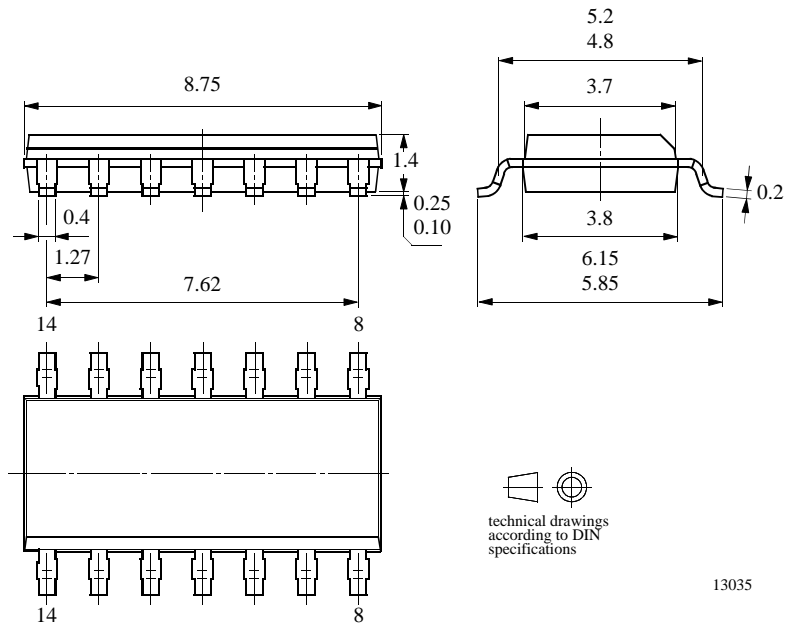


Figure 3. Application schematic

## Package Information

Package SO14

Dimensions in mm



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## Ozone Depleting Substances Policy Statement

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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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