

**LB1741**

## Octal NPN Darlington-pair Transistor Array

### Overview

The LB1741 is a high-current Darlington-pair transistor array that incorporates output clamp diodes, making it ideal for driving inductive loads.

The LB1741 with active-HIGH, 10.5k $\Omega$  impedance inputs interfaces directly to P-MOS or CMOS logic. With an input voltage of  $-0.5$  to 30V (max), outputs can sink 500mA (max) per channel and have 50V (max) output withstand voltage.

The LB1741 is available in 18-pin DIPs.

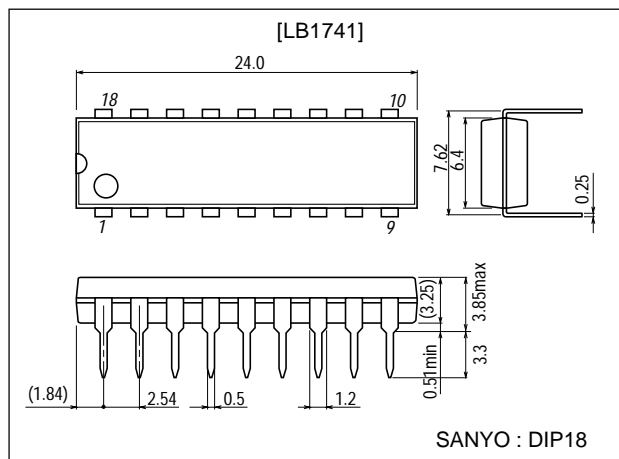
### Features

- Output clamp diodes.
- Drives inductive loads.
- Active-HIGH, 10.5k $\Omega$  impedance inputs.
- Interfaces to P-MOS or CMOS logic.
- 500mA (max) per channel output current sink.
- 50V (max) output withstand voltage.
- 30V (max) input voltage.
- 18-pin DIP.

### Package Dimensions

unit:mm

3007B-DIP18



### Specifications

**Absolute Maximum Ratings** at  $T_a = 25^\circ\text{C}$

| Parameter                      | Symbol            | Conditions | Ratings         | Unit             |
|--------------------------------|-------------------|------------|-----------------|------------------|
| Output withstand voltage range | $V_{CEO}$         |            | $-0.5$ to $+50$ | V                |
| Input voltage                  | $V_I$             |            | $-0.5$ to $+30$ | V                |
| Output current                 | $I_O$             |            | 500             | mA               |
| GND current                    | $I_{GND}$         |            | 3.2             | A                |
| Clamp diode withstand voltage  | $V_R$             |            | 50              | V                |
| Clamp diode forward current    | $I_F$             |            | 500             | mA               |
| Allowable power dissipation    | $P_d \text{ max}$ |            | 1.47            | W                |
| Operating temperature          | $T_{opr}$         |            | $-40$ to $+85$  | $^\circ\text{C}$ |
| Storage temperature            | $T_{stg}$         |            | $-55$ to $+150$ | $^\circ\text{C}$ |

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# LB1741

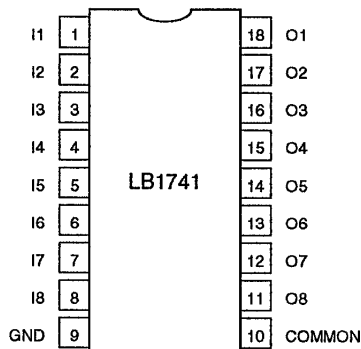
## Recommended Operating Ranges at $T_a = 25^\circ\text{C}$

| Parameter                      | Symbol    | Conditions                               | Ratings |     |     | Unit |
|--------------------------------|-----------|--|---------|-----|-----|------|
|                                |           |  | min     | typ | max |      |
| Output withstand voltage range | $V_{CEO}$ |  | 0       |     | 50  | V    |
| Input voltage                  | $V_I$     |  | 0       |     | 30  | V    |
| Output current                 | $I_O$     | TPW=25ms, 8% duty cycle, eight circuits  | 0       |     | 400 | mA   |
|                                |           | TPW=25ms, 25% duty cycle, eight circuits | 0       |     | 200 | mA   |
| Clamp diode withstand voltage  | $V_R$     |  |         |     | 50  | V    |
| Clamp diode forward current    | $I_F$     |  |         |     | 400 | mA   |

## Electrical Characteristics at $T_a = 25^\circ\text{C}$

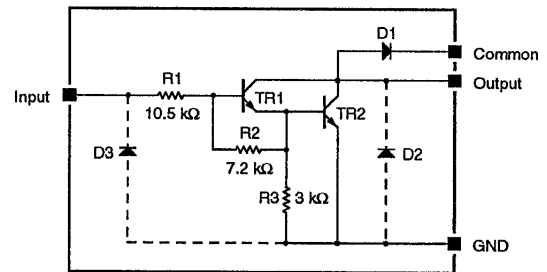
| Parameter                    | Symbol        | Conditions                                       | Ratings |     |      | Unit          |
|------------------------------|---------------|--|---------|-----|------|---------------|
|                              |               |  | min     | typ | max  |               |
| Turn-ON input voltage        | $V_{I(ON)}$   | $V_{CE}=2\text{V}, I_O=125\text{mA}$             |         |     | 5.0  | V             |
|                              |               | $V_{CE}=2\text{V}, I_O=200\text{mA}$             |         |     | 6.0  | V             |
|                              |               | $V_{CE}=2\text{V}, I_O=275\text{mA}$             |         |     | 7.0  | V             |
|                              |               | $V_{CE}=2\text{V}, I_O=350\text{mA}$             |         |     | 8.0  | V             |
| Transistor ON input current  | $I_{I(ON)}$   | $V_I=12\text{V}$                                 |         | 1.0 | 1.45 | mA            |
| Transistor OFF input current | $I_{I(OFF)}$  | $I_O=500\mu\text{A}$                             |         |     | 65   | $\mu\text{A}$ |
| DC current gain              | $h_{FE}$      | $V_{CE}=2\text{V}, I_O=350\text{mA}$             | 1000    |     |      |               |
| Output saturation voltage    | $V_{CE(sat)}$ | $I_I=500\mu\text{A}, I_O=350\text{mA}$           |         | 1.3 | 1.6  | V             |
|                              |               | $I_I=350\mu\text{A}, I_O=200\text{mA}$           |         | 1.1 | 1.3  | V             |
|                              |               | $I_O=250\mu\text{A}, I_O=100\text{mA}$           |         | 0.9 | 1.1  | V             |
| Output leakage current       | $I_{CEX}$     | $V_{CE}=50\text{V}$                              |         |     | 50   | $\mu\text{A}$ |
|                              |               | $V_{CE}=50\text{V}, V_I=1\text{V}$               |         |     | 500  | $\mu\text{A}$ |
| Clamp diode leakage current  | $I_R$         | $V_R=50\text{V}$                                 |         |     | 50   | $\mu\text{A}$ |
| Clamp diode forward voltage  | $V_F$         | $I_F=350\text{mA}$                               |         |     | 2.0  | V             |
| Input capacitance            | $C_I$         |  |         | 40  |      | pF            |
| Turn-ON delay time           | $t_{ON}$      | $R_L=125\Omega, C_L=15\text{pF}, V_O=50\text{V}$ |         | 0.1 |      | $\mu\text{s}$ |
| Turn-OFF delay time          | $t_{OFF}$     | $R_L=125\Omega, C_L=15\text{pF}, V_O=50\text{V}$ |         | 0.2 |      | $\mu\text{s}$ |

## Pinout



Top view

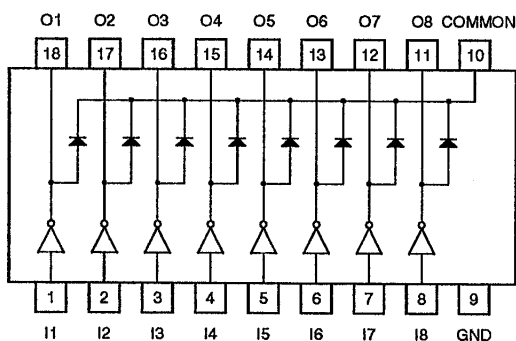
## Equivalent Circuit



### Notes

- Only one channel is shown.
- D2 and D3 are parasitic diodes.

## Block Diagram

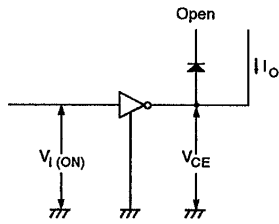


## Pin Function

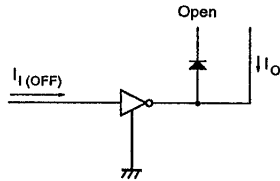
| Number   | Name     | Description        |
|----------|----------|--------------------|
| 1 to 8   | I1 to I8 | Transistor inputs  |
| 9        | GND      | Ground             |
| 10       | COMMON   | Transistor common  |
| 11 to 18 | O1 to O8 | Transistor outputs |

## Measurement Circuits

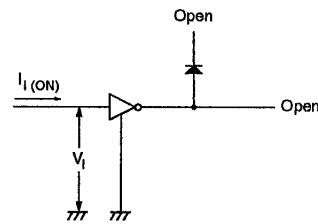
### Turn-ON input voltage



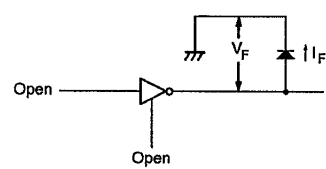
### OFF-state input current



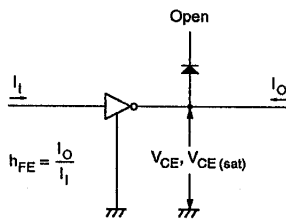
### ON-state input current



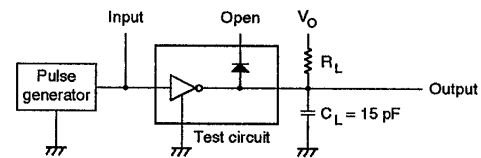
### Clamp diode forward voltage



### DC current gain and output saturation voltage



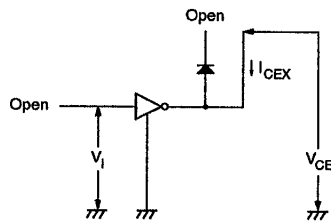
### Turn-ON turn-OFF delay times



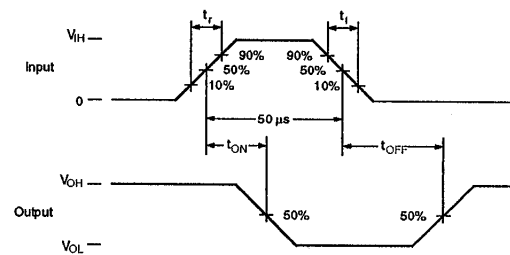
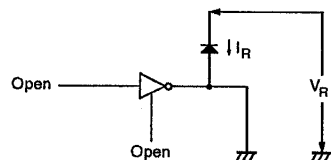
#### Notes

1. 50μs pulsewidth, 10% duty cycle, 50Ω pulse generator output impedance,  $t_r \leq 5\text{ns}$ ,  $t_f \leq 10\text{ns}$ ,  $V_I = 8\text{V}$ .

### Output leakage current



### Clamp diode leakage current



2.  $C_L$  includes probe and jig capacitances.

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