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# HA13007

## Quad Driver

### Description

The HA13007 monolithic, bipolar, high-voltage, high-current quad driver is especially designed for switching applications. This device is recommended for interfacing low-level logic to peripheral loads such as relays, solenoids, stepping motors, LED, heaters, and other similar high-voltage, high-current loads.

### Features

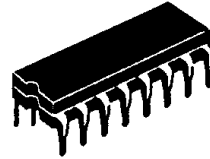
- Guaranteed minimum output breakdown of 60 V, and maximum output current of 0.7 A
- Low output collector-emitter saturation voltage
- Input compatible with TTL, LSTTL and 5 V CMOS.
- Integral transient suppression diodes for inductive loads
- Lower input current

**Table 1 Truth Table**

| ENABLE | IN | OUT |
|--------|----|-----|
| H      | H  | L   |
| H      | L  | H   |
| L      | X  | H   |

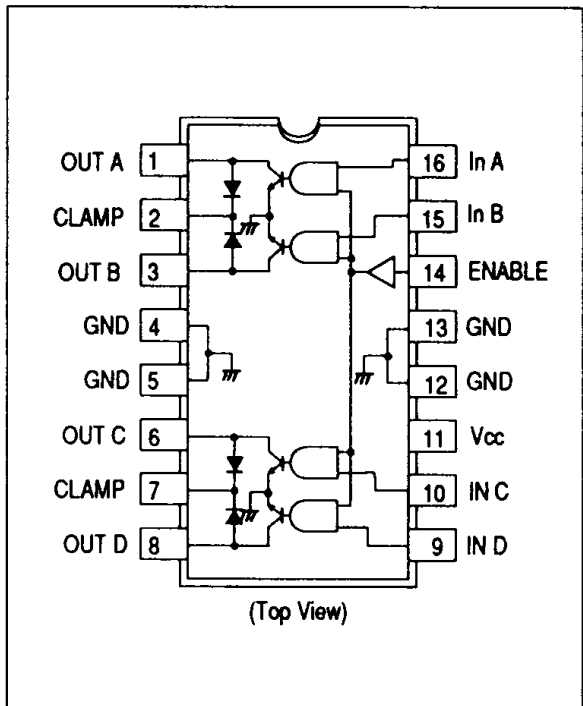
Note: H=High level: 2.0 V  
L=Low level: 0.8 V  
X=Don't care

**HA13007**



(DP-16C)

### Pin Arrangement



### Ordering Information

| Type No. | Package |
|----------|---------|
| HA13007  | DC-16C  |



**Table 2 Absolute Maximum Ratings (Ta=25 °C)**

| Item                                 | Symbol           | Rating               | Unit | Note |
|--------------------------------------|------------------|----------------------|------|------|
| Supply voltage                       | V <sub>CC</sub>  | 7.0                  | V    | 1    |
| Input voltage                        | V <sub>IN</sub>  | 0 to V <sub>CC</sub> | V    |      |
| Output voltage                       | V <sub>CEX</sub> | 60                   | V    |      |
| Output current                       | I <sub>OUT</sub> | 0.7                  | A    |      |
| Power dissipation                    | P <sub>T</sub>   | 1.85                 | W    | 2    |
| Thermal resistance                   | Junction-case    | θ <sub>jc</sub>      | 15   | °C/W |
|                                      | Junction-ambient | θ <sub>ja</sub>      | 60   | °C/W |
| Junction temperature                 | T <sub>j</sub>   | 150                  | °C   |      |
| Operating junction temperature range | T <sub>jop</sub> | -40 to +125          | °C   |      |
| Storage temperature range            | T <sub>stg</sub> | -55 to +125          | °C   |      |

The absolute maximum ratings are limiting values, to be applied individually, beyond which the device may be permanently damaged. Functional operation under any of these conditions is not guaranteed. Exposing a circuit to its absolute maximum rating for extended periods of time may affect the device's reliability.

- Notes: 1. Recommended operating voltage V<sub>CC</sub> = 4.75 to 5.5 V  
 2. Thermal resistances are as follows:  
 θ<sub>j-a1</sub> ≤ 60 °C/W (Soldered on a print circuit board)  
 θ<sub>j-a2</sub> ≤ 35 °C/W (Soldered on a print circuit board with copper sufficiently)  
 θ<sub>j-a3</sub> ≤ 15 °C/W (Soldered on pins 4, 5, 12, and 13 with an infinite heat sink)

**Table 3 Electrical Characteristics (Ta=25 °C, V<sub>CC</sub>=5.5 V)**

| Item                      | Symbol               | Min | Typ | Max | Unit | Test Condition   |
|---------------------------|----------------------|-----|-----|-----|------|--|
| Output leakage current    | I <sub>CEX</sub>     | —   | —   | 100 | μA   | V <sub>CE</sub> =60 V, V <sub>IN</sub> =0.8 V                            |
| Output sustaining voltage | V <sub>CE(sus)</sub> | 60  | —   | —   | V    | V <sub>IN</sub> =0.8 V, I <sub>c</sub> =10 mA                            |
| Output saturation voltage | V <sub>CE(sat)</sub> | —   | 0.3 | 0.5 | V    | V <sub>CC</sub> =4.75 V, I <sub>c</sub> =0.4 A<br>V <sub>IN</sub> =2.0 V |
|                           |                      | —   | 0.5 | 0.7 |      |  |
| Input low voltage         | V <sub>IL</sub>      | —   | —   | 0.8 | V    |  |
| Input low current         | I <sub>IL</sub>      | —   | -1  | ±10 | μA   | V <sub>IN</sub> =0.8 V, I <sub>c</sub> =0                                |
| Input high voltage        | V <sub>IH</sub>      | 2.0 | —   | —   | V    |  |



# HA13007

## Electrical Characteristics (Ta=25 °C, Vcc=5.5 V) (cont)

|                                  |                  |   |     |     |    |  |                        |
|----------------------------------|------------------|---|-----|-----|----|--|------------------------|
| Input high current               | I <sub>IH</sub>  | — | 0   | ±10 | μA | I <sub>C</sub> =0.7 A x 4                                      | V <sub>IN</sub> =2.0 V |
|                                  |                  | — | —   | 1.0 | mA |  | V <sub>IN</sub> =5.0 V |
| Supply current (all outputs on)  | I <sub>S</sub>   | — | 50  | 65  | mA | I <sub>C</sub> =0.7 A x 4, V <sub>IN</sub> =5.5 V (All Inputs) |                        |
| Supply current (all outputs off) | I <sub>SO</sub>  | — | 8.0 | —   | mA | V <sub>IN</sub> =0.8 V (All Inputs)                            |                        |
| Clamp diode leakage current      | I <sub>R</sub>   | — | —   | 100 | μA | V <sub>R</sub> =60 V   |                        |
| Clamp diode forward voltage      | V <sub>F</sub>   | — | 1.2 | 1.6 | V  | V <sub>IN</sub> =0.8 V   | I <sub>F</sub> =1.0 A  |
|                                  |                  | — | 1.3 | 2.0 | V  |  | I <sub>F</sub> =1.5 A  |
| Turn-on delay                    | t <sub>PLH</sub> | — | 1.0 | —   | μs |  |                        |
| Turn-off delay                   | t <sub>PHL</sub> | — | 0.3 | —   | μs |  |                        |

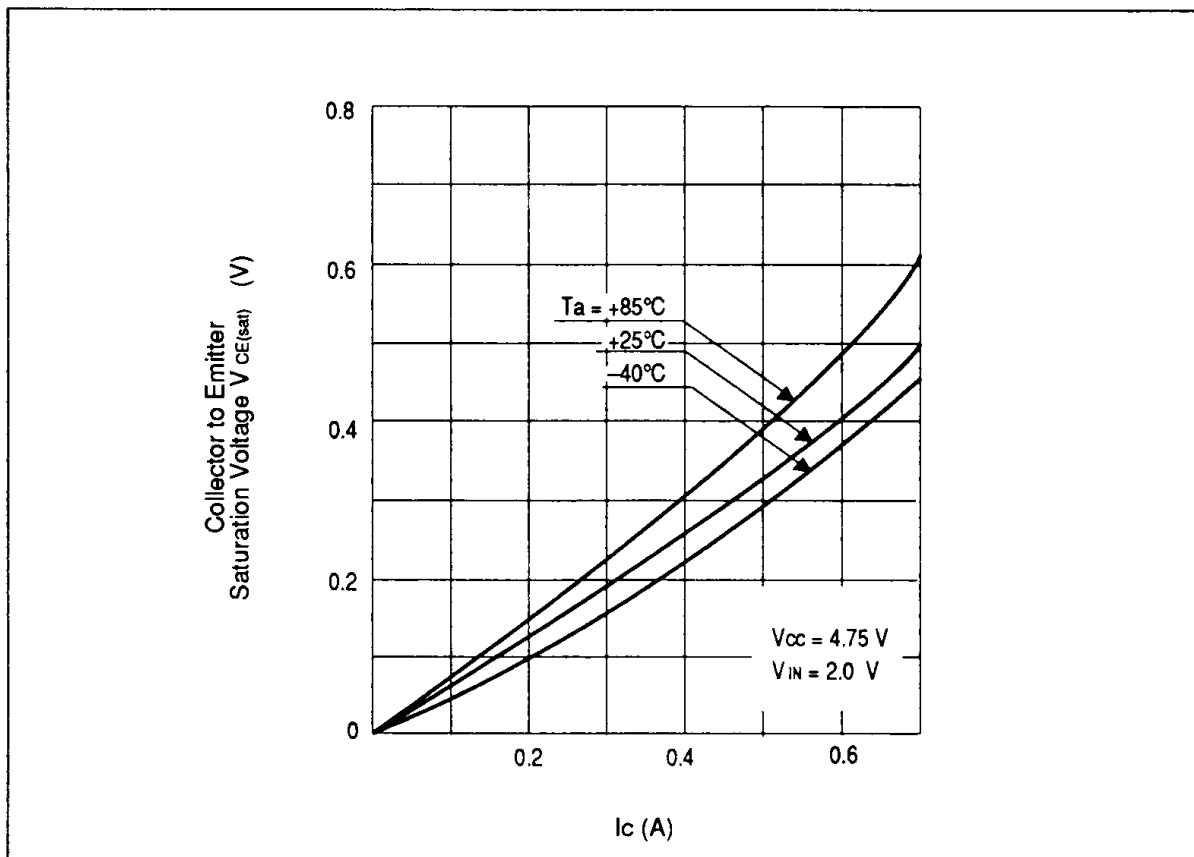


Figure 1 Output Saturation Voltage vs Output Current



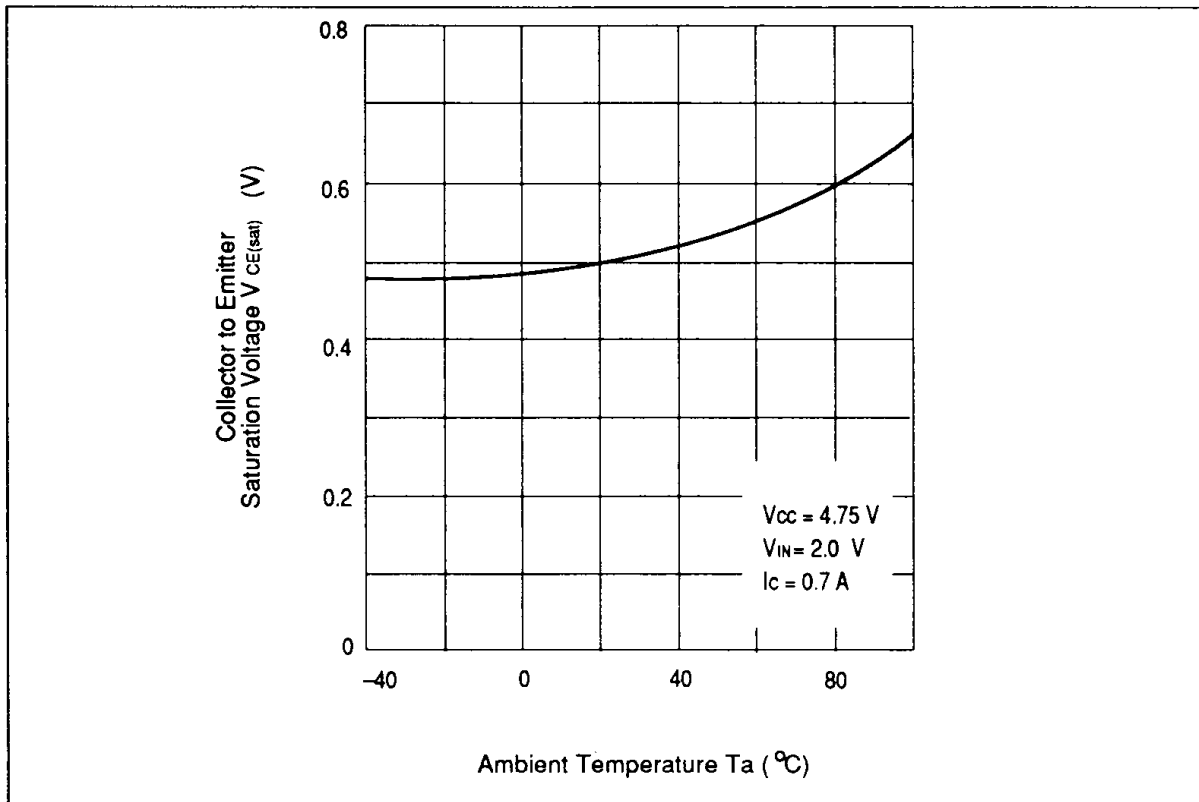


Figure 2 Output Saturation Voltage vs Ambient Temperature

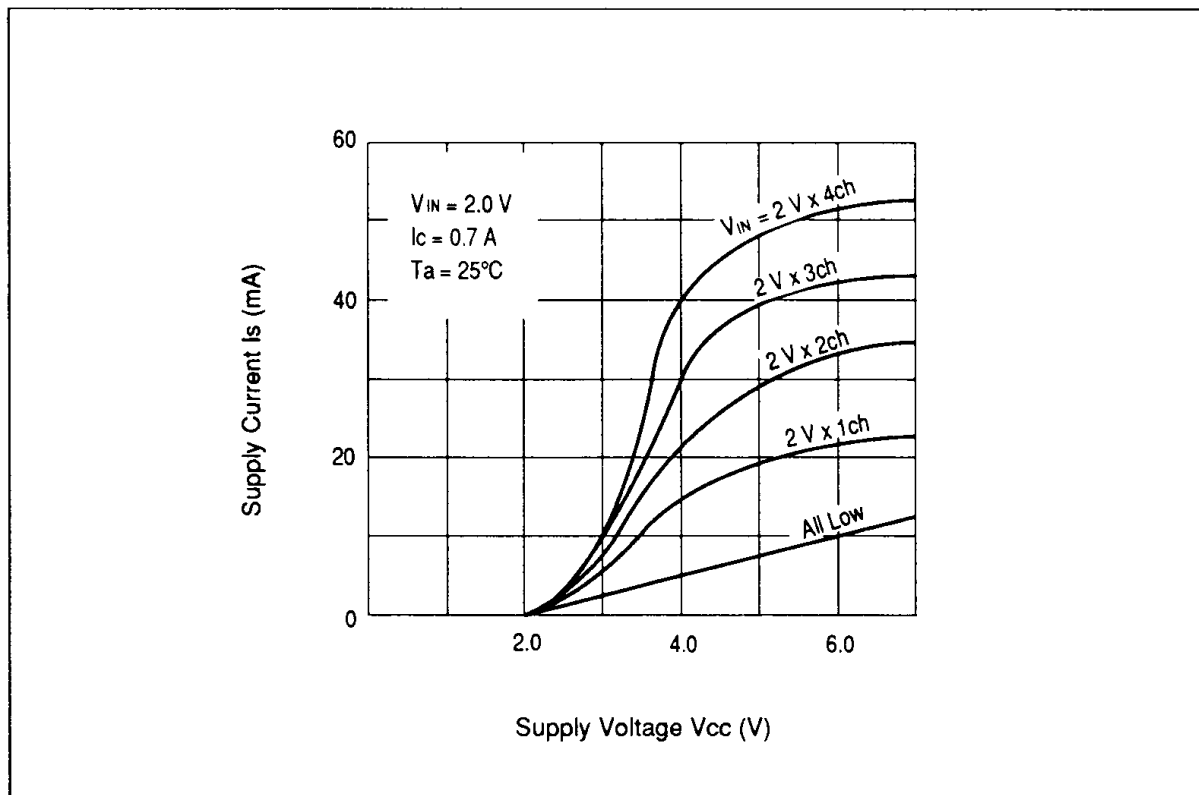


Figure 3 Output Current vs Supply Voltage



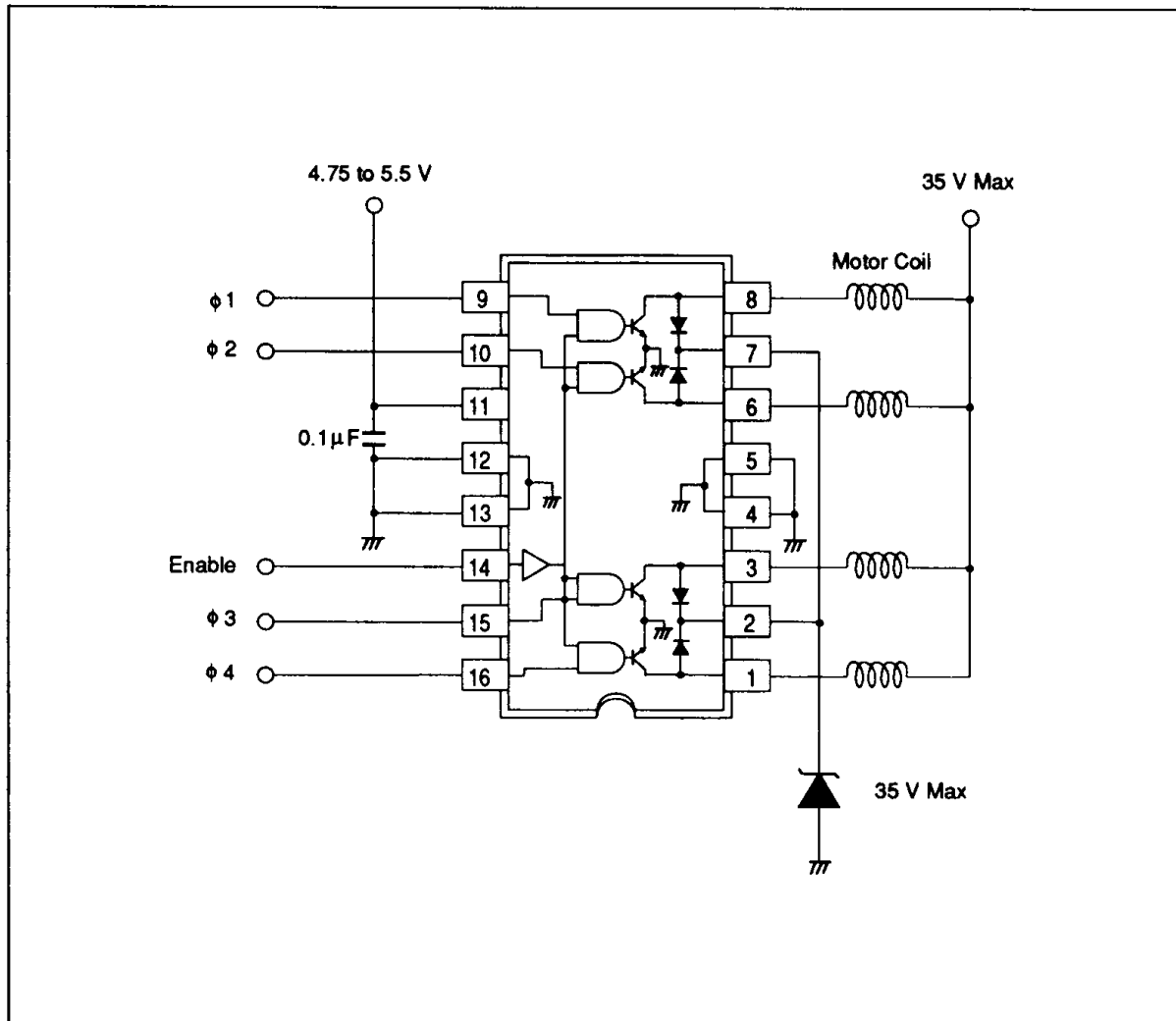


Figure 4 Stepping Motor Drive Application