

TOSHIBA BIPOLAR DIGITAL INTEGRATED CIRCUIT SILICON MONOLITHIC

**TD62304P, TD62304AP, TD62304F, TD62304AF**  
**TD62305P, TD62305AP, TD62305F, TD62305AF**

## 7CH LOW ACTIVE DARLINGTON SINK DRIVER

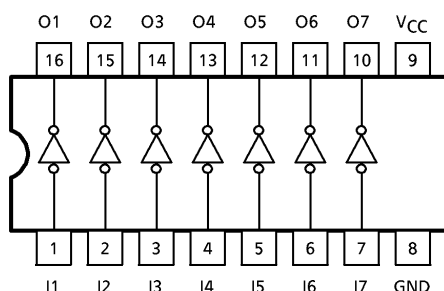
The TD62304P/AP/F/AF and TD62305P/AP/F/AF are non-inverting transistor arrays, which are comprised of eight NPN darlington output stages and PNP input stages.

These devices are Low Level input active drivers and are suitable for operations with TTL, 5V CMOS and 5V Microprocessor which have sink current output drivers. Applications include relay, hammer, lamp and LED driver.

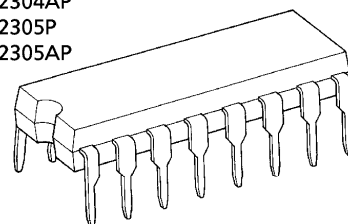
### FEATURES

- Output current (single output) 500mA (Max.)
- High sustaining voltage 35V (TD62304P/F, 62305P/F) 50V (TD62304AP/AF, 62305AP/AF) (Min.)
- Low level active input
- Standard supply voltage
- Input compatible with TTL and 5V CMOS

### PIN CONNECTION (TOP VIEW)

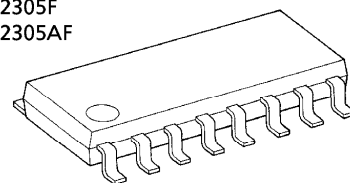


TD62304P  
 TD62304AP  
 TD62305P  
 TD62305AP



DIP16-P-300-2.54A

TD62304F  
 TD62304AF  
 TD62305F  
 TD62305AF



SOP16-P-225-1.27

### Weight

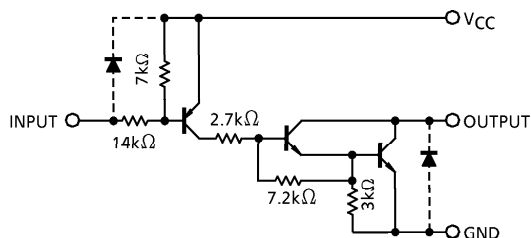
DIP16-P-300-2.54A : 1.11g (Typ.)  
 SOP16-P-225-1.27 : 0.16g (Typ.)

961001EBA2

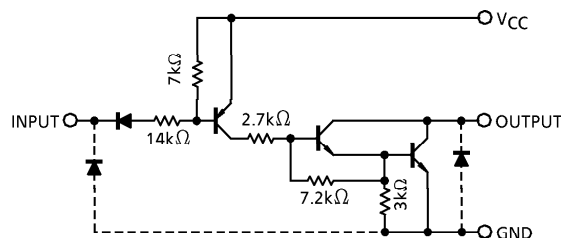
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**SCHEMATICS (EACH DRIVER)**

TD62304P / AP / F / AF



TD62305P / AP / F / AF



(Note) The input and output parasitic diodes cannot be used as clamp diodes.

**MAXIMUM RATINGS (Ta = 25°C)**

| CHARACTERISTIC            |       | SYMBOL                | RATING                     | UNIT    |
|---------------------------|-------|-----------------------|----------------------------|---------|
| Supply Voltage            |       | V <sub>CC</sub>       | − 0.5~7.0                  | V       |
| Output Sustaining Voltage | P, F  | V <sub>CE (SUS)</sub> | − 0.5~35                   | V       |
|                           | AF    |                       | − 0.5~50                   |         |
|                           | AP    |                       | − 0.5~50                   |         |
| Output Current            |       | I <sub>OUT</sub>      | 500                        | mA / ch |
| Input Voltage             |       | V <sub>IN</sub>       | − 22~V <sub>CC</sub> + 0.5 | V       |
|                           |       |                       | − 0.5~7 (Note 1)           |         |
| Input Current             |       | I <sub>IN</sub>       | − 10                       | mA      |
| Power Dissipation         | P     | P <sub>D</sub>        | 1.0                        | W       |
|                           | AP    |                       | 1.47                       |         |
|                           | F, AF |                       | 0.625 (Note 2)             |         |
| Operating Temperature     | P     | T <sub>opr</sub>      | − 30~75                    | °C      |
|                           |       |                       | − 40~85                    |         |
| Storage Temperature       |       | T <sub>stg</sub>      | − 50~150                   | °C      |

(Note 1) TD62305P / AP / F / AF

(Note 2) On glass epoxy PCB (30 × 30 × 1.6mm Cu 50%)

## RECOMMENDED OPERATING CONDITIONS (Ta = -40~85°C and Ta = -30~75°C for Type-P)

| CHARACTERISTIC            |                        | SYMBOL                | CONDITION                                        | MIN. | TYP. | MAX.            | UNIT    |
|---------------------------|------------------------|-----------------------|--------------------------------------------------|------|------|-----------------|---------|
| Supply Voltage            |                        | V <sub>CC</sub>       | —                                                | 4.5  | 5.0  | 5.5             | V       |
| Output Sustaining Voltage | P, F                   | V <sub>CE (SUS)</sub> | —                                                | 0    | —    | 35              | V       |
|                           | AF                     |                       |                                                  | 0    | —    | 50              |         |
|                           | AP                     |                       |                                                  | 0    | —    | 50              |         |
| Output Current            |                        | I <sub>OUT</sub>      | DC 1 circuit                                     | 0    | —    | 350             | mA / ch |
|                           |                        |                       | T <sub>pw</sub> = 25ms, duty = 10%<br>7 circuits | 0    | —    | 300             |         |
|                           |                        |                       | T <sub>pw</sub> = 25ms, duty = 10%<br>7 circuits | 0    | —    | 350             |         |
|                           |                        |                       | T <sub>pw</sub> = 25ms, duty = 20%<br>7 circuits | 0    | —    | 200             |         |
| Input Voltage             | TD62304P / AP / F / AF | V <sub>IN</sub>       | —                                                | − 20 | —    | V <sub>CC</sub> | V       |
|                           | TD62305P / AP / F / AF |                       |                                                  | 0    | —    | 5.5             |         |
| Power Dissipation         |                        | P                     | —                                                | —    | —    | 0.44            | W       |
|                           |                        | AP                    | —                                                | —    | —    | 0.52            |         |
|                           |                        | F, AF                 | (Note 1)                                         | —    | —    | 0.325           |         |

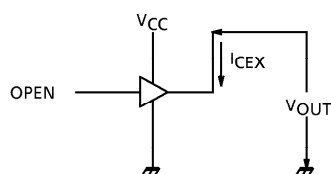
(Note 1) On glass epoxy PCB (30×30×1.6mm Cu 50%)

## ELECTRICAL CHARACTERISTICS (Ta = 25°C)

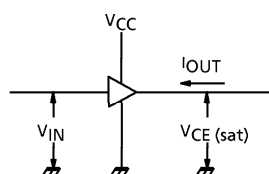
| CHARACTERISTIC            |              | SYMBOL                | TEST CIR-<br>CUIT | TEST CONDITION                                     |                                                | MIN.                                           | TYP.   | MAX.                  | UNIT |   |
|---------------------------|--------------|-----------------------|-------------------|----------------------------------------------------|------------------------------------------------|------------------------------------------------|--------|-----------------------|------|---|
| Output Leakage Current    | P / F        | I <sub>CEX</sub>      | 1                 | V <sub>CC</sub> = 5.5V<br>V <sub>IN</sub> = 0V     | V <sub>OUT</sub> = 35V,<br>Ta = 75°C           | —                                              | —      | - 100                 | μA   |   |
|                           |              |                       |                   |                                                    | V <sub>OUT</sub> = 50V,<br>Ta = 85°C           |                                                |        |                       |      |   |
| Output Saturation Voltage |              | V <sub>CE</sub> (sat) | 2                 | V <sub>CC</sub> = 4.5V<br>I <sub>OUT</sub> = 350mA | V <sub>IN</sub> = V <sub>IN</sub> (ON) MAX.    | —                                              | 1.4    | 2.0                   | V    |   |
| Input Current             | (Output On)  | I <sub>IN</sub> (ON)  | 3                 | V <sub>CC</sub> = 5.5V, V <sub>IN</sub> = 0.4V     |                                                | —                                              | - 0.32 | - 0.45                | mA   |   |
|                           |              |                       |                   | V <sub>CC</sub> = 5.5V, V <sub>IN</sub> = - 20V    |                                                | —                                              | —      | - 2.6                 |      |   |
|                           | (Output Off) | I <sub>IN</sub> (OFF) | 4                 | —                                                  |                                                | —                                              | —      | - 40                  | μA   |   |
| Input Voltage (Output On) | TD62304      | V <sub>IN</sub> (ON)  | 5                 | —                                                  |                                                | —                                              | —      | V <sub>CC</sub> - 2.8 | V    |   |
|                           | TD62305      |                       |                   |                                                    |                                                | —                                              | —      | V <sub>CC</sub> - 3.7 |      |   |
| Supply Current            | (Output On)  | I <sub>CC</sub> (ON)  | 6                 | V <sub>CC</sub> = 5.5V, V <sub>IN</sub> = 0V       |                                                | —                                              | 17     | 22                    | mA   |   |
|                           | (Output Off) | I <sub>CC</sub> (OFF) | 6                 | V <sub>CC</sub> = V <sub>IN</sub> = 5.5V           |                                                | —                                              | —      | 100                   |      |   |
| Turn-On Delay             | P, F         | t <sub>ON</sub>       | 7                 | V <sub>CC</sub> = 5V<br>C <sub>L</sub> = 15pF      | V <sub>OUT</sub> = 35V, R <sub>L</sub> = 87.5Ω | —                                              | 0.1    | —                     | μs   |   |
|                           | AP, AF       |                       |                   |                                                    | V <sub>OUT</sub> = 50V, R <sub>L</sub> = 125Ω  |                                                |        |                       |      |   |
| Turn-Off Delay            | P, F         | t <sub>OFF</sub>      |                   |                                                    |                                                | V <sub>OUT</sub> = 35V, R <sub>L</sub> = 87.5Ω | —      | 3                     |      | — |
|                           | AP, AF       |                       |                   |                                                    | V <sub>OUT</sub> = 50V, R <sub>L</sub> = 125Ω  |                                                |        |                       |      |   |

## TEST CIRCUIT

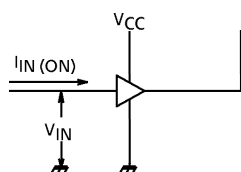
## 1. I<sub>CEX</sub>



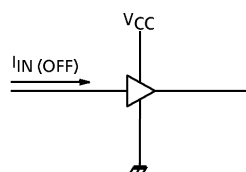
2.  $V_{CE}(\text{sat})$



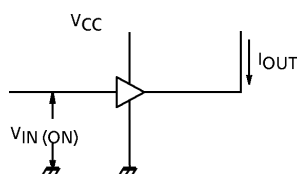
### 3. IIN (ON)



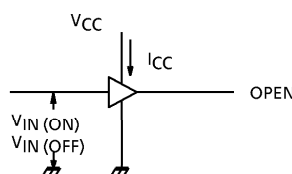
#### 4. I<sub>IN</sub> (OFF)



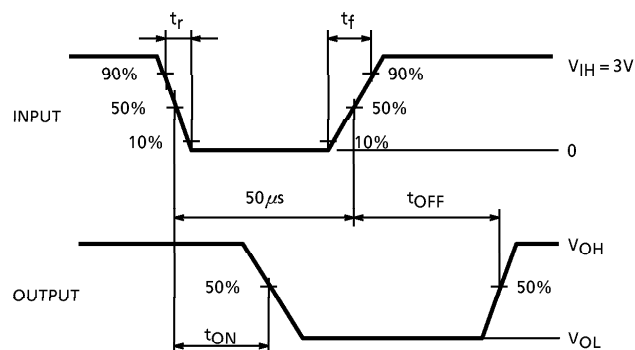
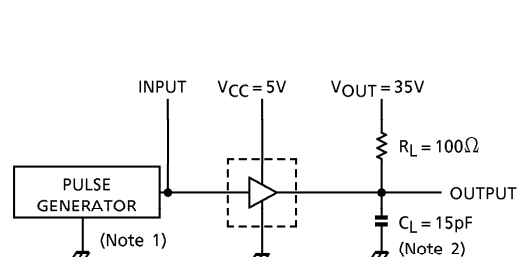
### 5. $V_{IN(ON)}$



## 6. ICC



### 7. $t_{ON}$ , $t_{OFF}$

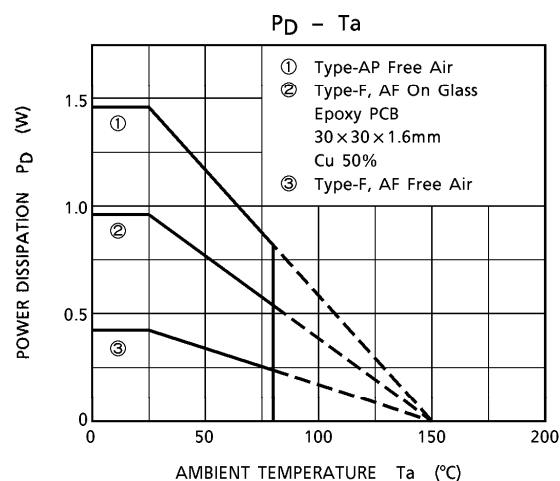
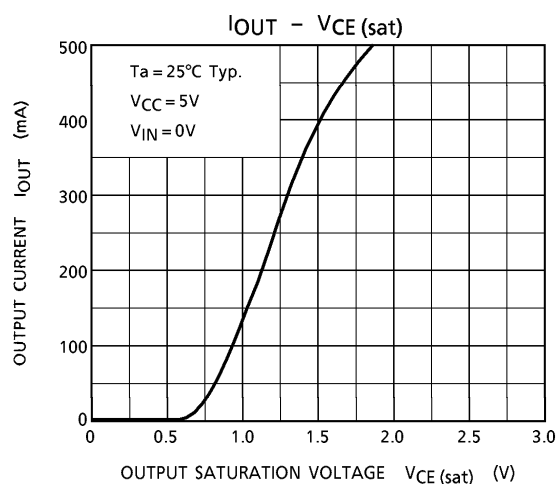
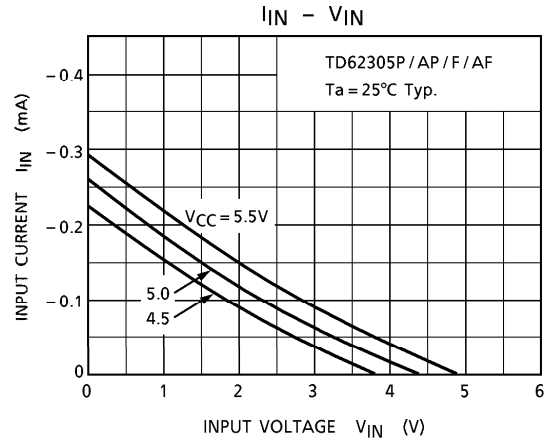
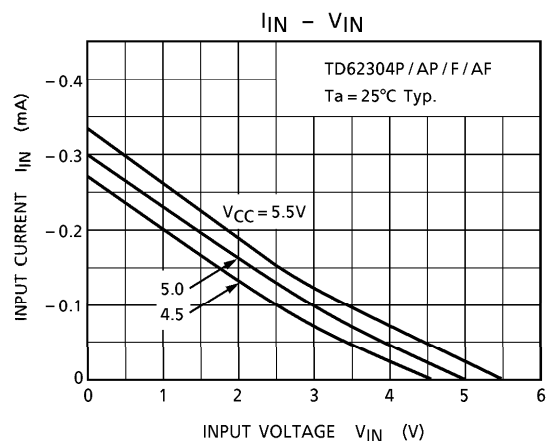
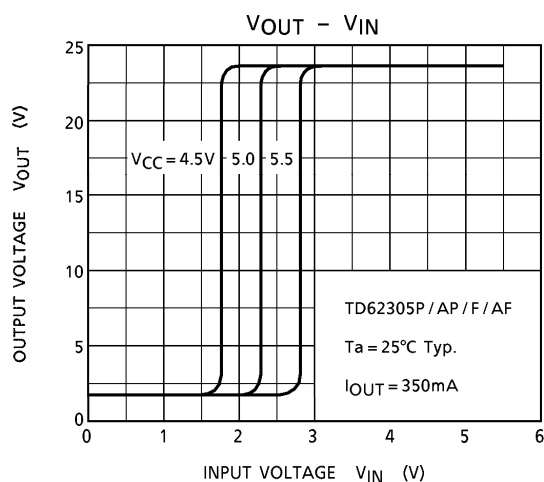
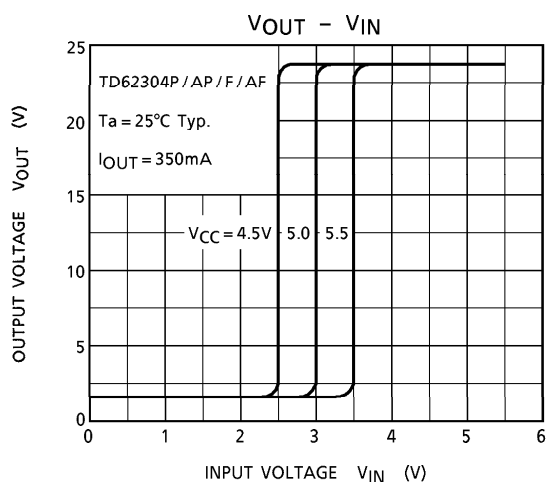


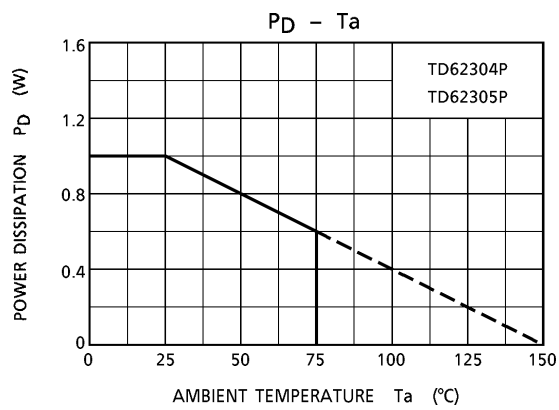
(Note 1) Pulse width  $50\mu\text{s}$ , duty cycle 10%  
Output impedance  $50\Omega$ ,  $t_r \leq 10\text{ns}$ ,  $t_f \leq 5\text{ns}$

(Note 2)  $C_L$  includes probe and jig capacitance.

## PRECAUTIONS FOR USING

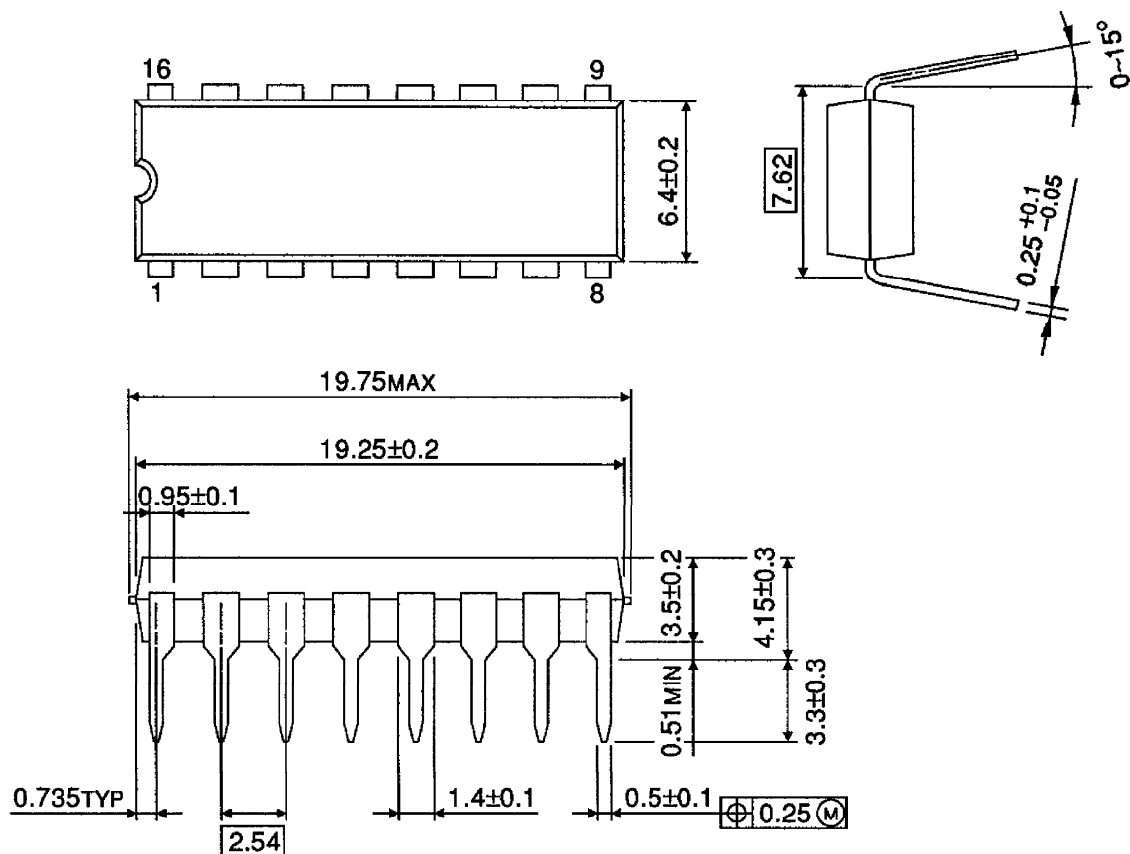
Utmost care is necessary in the design of the output line,  $V_{CC}$  and GND line since IC may be destroyed due to short-circuit between outputs, air contamination fault, or fault by improper grounding.





**OUTLINE DRAWING**  
DIP16-P-300-2.54A

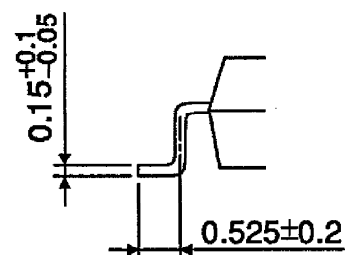
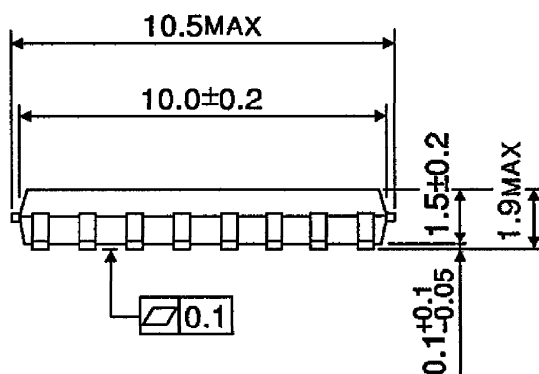
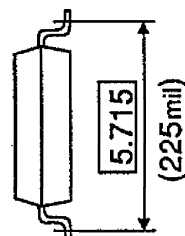
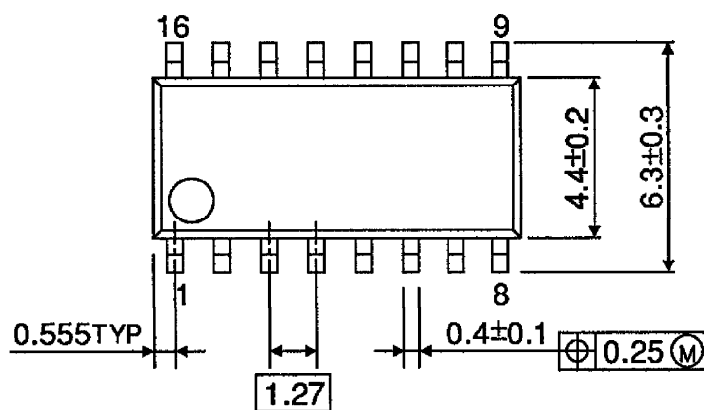
Unit : mm



Weight : 1.11g (Typ.)

**OUTLINE DRAWING**  
SOP16-P-225-1.27

Unit : mm



Weight : 0.16g (Typ.)