

TOSHIBA BIPOLAR DIGITAL INTEGRATED CIRCUIT SILICON MONOLITHIC

# TD62303P, TD62303F

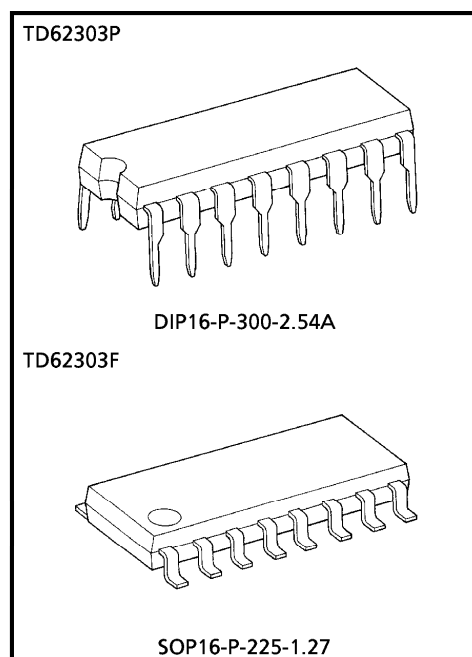
## 6CH DIGIT DRIVER

The TD62303P and TD62303F are comprised of six NPN low saturation drivers.

These devices are specifically designed for multiplexed digit driving of six digits common cathode LED displays. This device is intended for use with TTL and 5V CMOS.

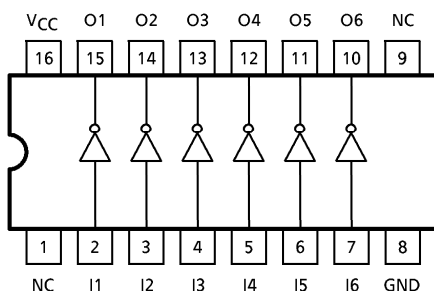
### FEATURES

- Low saturation output :  $V_{CE(sat)} = 0.8V$  (Max.)
- Output rating (single output) 17V (Min.) / 500mA (Max.)
- Input compatible with TTL and 5V CMOS
- Suitable for digit-driver of 6 digit common cathode LED displays.
- Package type-P : DIP-16pin
- Package type-F : SOP-16pin

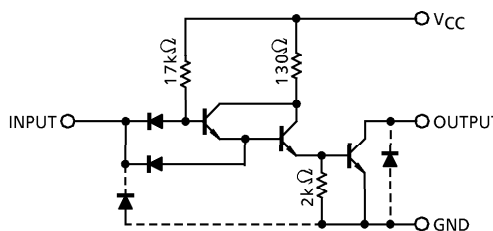


Weight  
DIP16-P-300-2.54A : 1.11g (Typ.)  
SOP16-P-225-1.27 : 0.16g (Typ.)

### PIN CONNECTION (TOP VIEW)



### SCHEMATICS (EACH DRIVER)



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

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**MAXIMUM RATINGS (Ta = 25°C)**

| CHARACTERISTIC            |   | SYMBOL                | RATING                      | UNIT    |
|---------------------------|---|-----------------------|-----------------------------|---------|
| Supply Voltage            |   | V <sub>CC</sub>       | - 0.5~7.0                   | V       |
| Output Sustaining Voltage |   | V <sub>CE (SUS)</sub> | - 0.5~17                    | V       |
| Output Current            |   | I <sub>OUT</sub>      | 500                         | mA / ch |
| Input Voltage             |   | V <sub>IN</sub>       | - 0.5~V <sub>CC</sub> + 0.5 | V       |
| Input Current             |   | I <sub>IN</sub>       | - 10                        | mA      |
| Power Dissipation         | P | P <sub>D</sub>        | 1.0                         | W       |
|                           | F |                       | 0.625 (Note)                |         |
| Operating Temperature     | P | T <sub>opr</sub>      | - 30~75                     | °C      |
|                           | F |                       | - 40~85                     |         |
| Storage Temperature       |   | T <sub>stg</sub>      | - 50~150                    | °C      |

(Note) On Glass Epoxy PCB (30×30×1.6mm Cu 50%)

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

| CHARACTERISTIC            |   | SYMBOL                | CONDITION    | MIN. | TYP. | MAX.            | UNIT    |
|---------------------------|---|-----------------------|--------------|------|------|-----------------|---------|
| Supply Voltage            |   | V <sub>CC</sub>       | —            | 4.5  | 5.0  | 5.5             | V       |
| Output Sustaining Voltage |   | V <sub>CE (SUS)</sub> | —            | 0    | —    | 15              | V       |
| Output Current            |   | I <sub>OUT</sub>      | DC 1 Circuit | 0    | —    | 350             | mA / ch |
| Input Voltage             |   | V <sub>IN</sub>       | —            | 0    | —    | V <sub>CC</sub> | V       |
| Power Dissipation         | P | P <sub>D</sub>        | —            | —    | —    | 0.44            | W       |
|                           | F |                       | (Note)       | —    | —    | 0.325           |         |

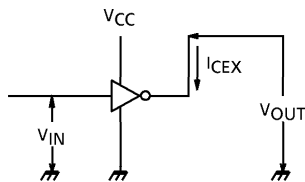
(Note) On Glass Epoxy PCB (30×30×1.6mm Cu 50%)

**ELECTRICAL CHARACTERISTICS (Ta = 25°C)**

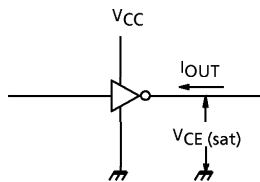
| CHARACTERISTIC            |            | SYMBOL                | TEST CIR-CUIT | TEST CONDITION  | MIN.      | TYP. | MAX.   | UNIT      |    |
|---------------------------|------------|-----------------------|---------------|---|-----------|------|--------|-----------|----|
| Output Leakage Current    | P          | I <sub>CEX</sub>      | 1             | V <sub>CC</sub> = 5.5V, V <sub>IN</sub> = 0V<br>V <sub>OUT</sub> = 15V                          | Ta = 75°C | —    | —      | 100       | μA |
|                           | F          |                       |               |   | Ta = 85°C |      |        |           |    |
| Output Saturation Voltage |            | V <sub>CE (sat)</sub> | 2             | V <sub>CC</sub> = 4.5V, I <sub>OUT</sub> = 150mA  | —         | 0.3  | 0.4    | V         |    |
|                           |            |                       |               | V <sub>CC</sub> = 4.5V, I <sub>OUT</sub> = 350mA  | —         | 0.65 | 0.8    |           |    |
| Input Current             | Output On  | I <sub>IN (ON)</sub>  | 3             | V <sub>CC</sub> = 5.5V, V <sub>IN</sub> = 5.5V  | —         | —    | 40     | μA        |    |
|                           | Output Off | I <sub>IN (OFF)</sub> | 4             | V <sub>CC</sub> = 5.5V, V <sub>IN</sub> = 0.4V  | —         | —    | - 0.36 | mA        |    |
| Input Voltage             | Output On  | V <sub>IN (ON)</sub>  | 5             | —   | —         | —    | 2.0    | V         |    |
|                           | Output Off | V <sub>IN (OFF)</sub> | 5             | —   | 0.8       | —    | —      |           |    |
| Supply Current            |            | I <sub>CC</sub>       | 6             | V <sub>CC</sub> = 5.5V, V <sub>IN</sub> = 5.5V  | —         | —    | 47     | mA / Gate |    |
| Turn-On Delay             |            | t <sub>ON</sub>       | 7             | V <sub>CC</sub> = 5.0V, R <sub>L</sub> = 37.5Ω<br>V <sub>OUT</sub> = 15V, C <sub>L</sub> = 15pF | —         | 0.1  | —      | μs        |    |
| Turn-Off Delay            |            | t <sub>OFF</sub>      |               |   | —         | 0.7  | —      | μs        |    |

TEST CIRCUIT

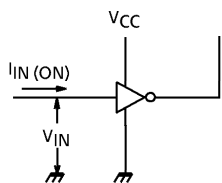
1.  $I_{CEX}$



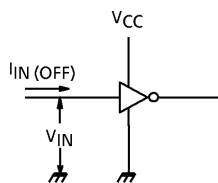
2.  $V_{CE(sat)}$



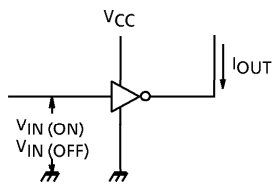
3.  $I_{IN(ON)}$



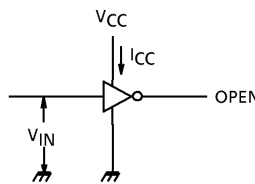
4.  $I_{IN(OFF)}$



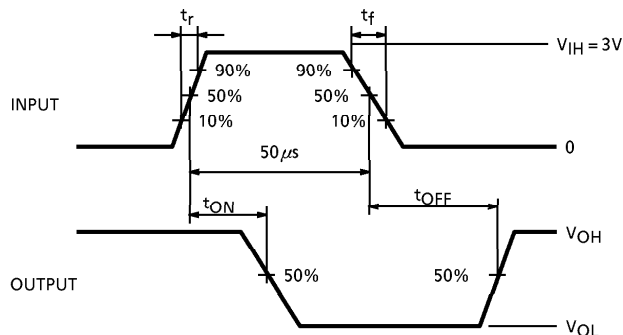
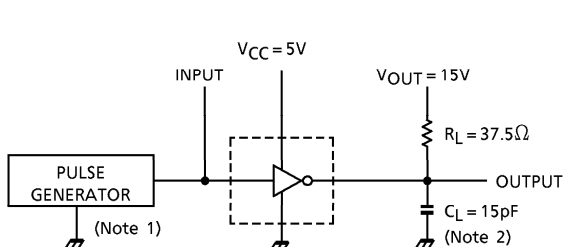
5.  $V_{IN(ON)}$ ,  $V_{IN(OFF)}$



6.  $I_{CC}$



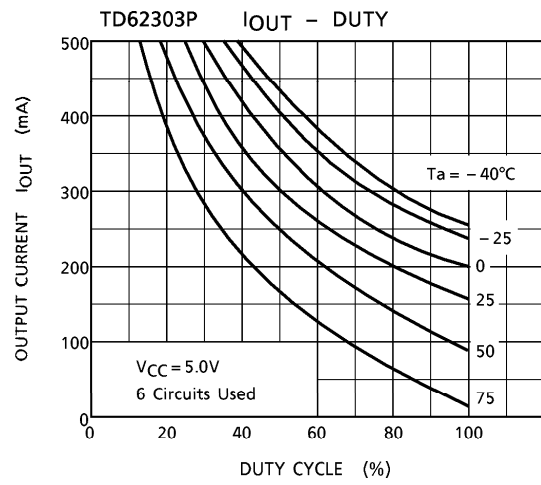
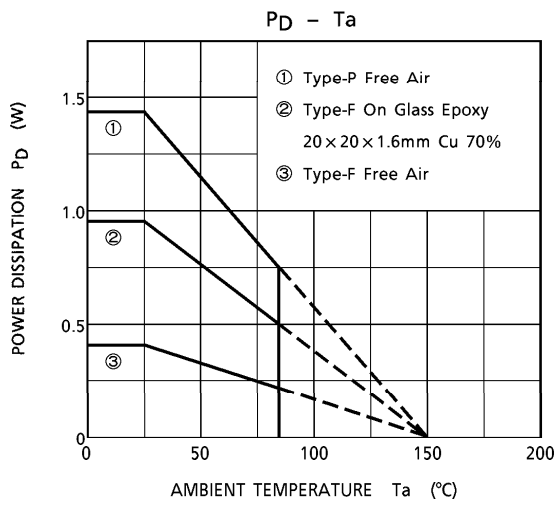
7.  $t_{ON}$ ,  $t_{OFF}$



- (Note 1) Pulse width  $50\mu s$ , duty cycle 10%  
Output impedance  $50\Omega$ ,  $t_r \leq 5ns$ ,  $t_f \leq 10ns$
- (Note 2)  $C_L$  includes probe and jig capacitance.

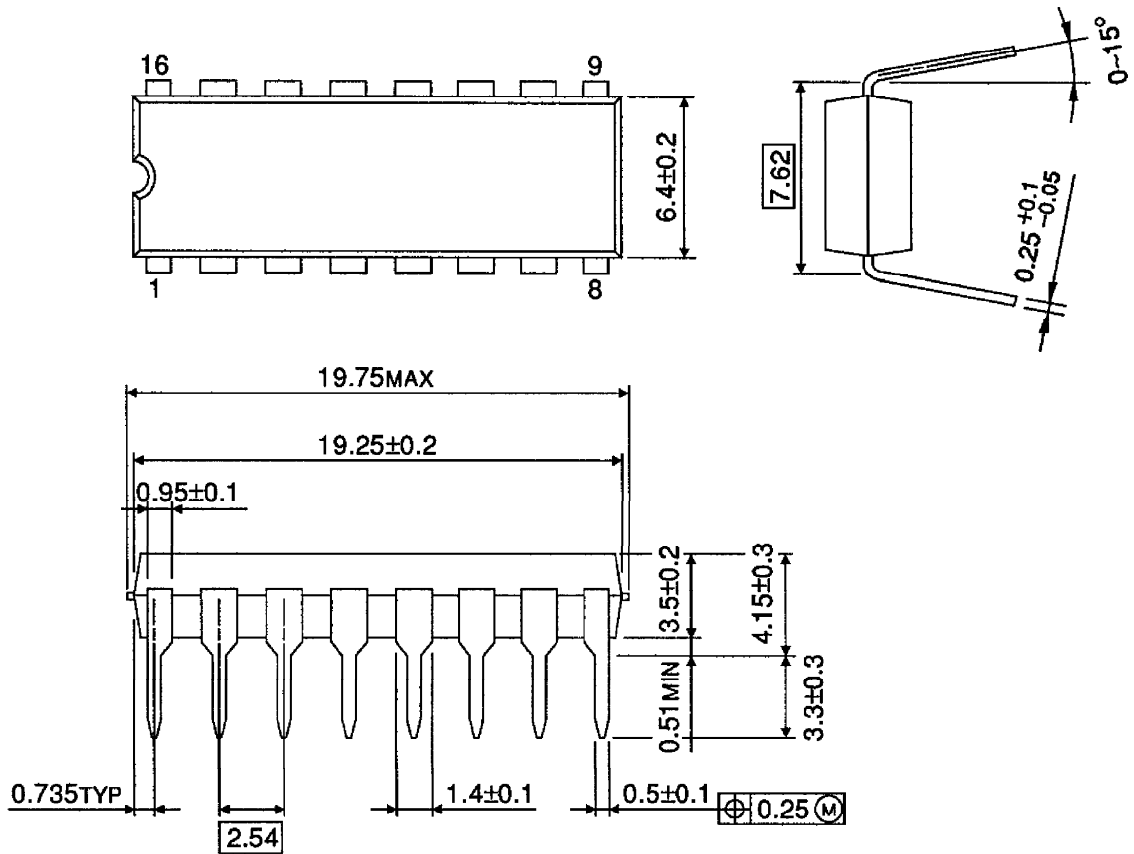
PRECAUTIONS for USING

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

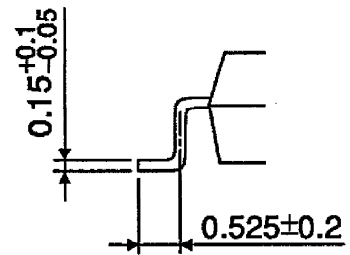
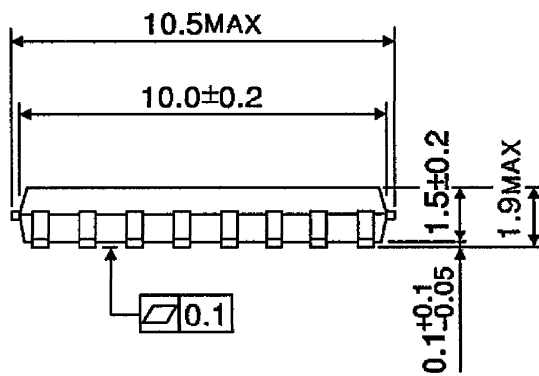
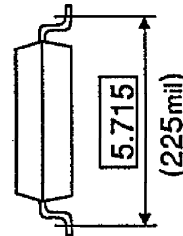
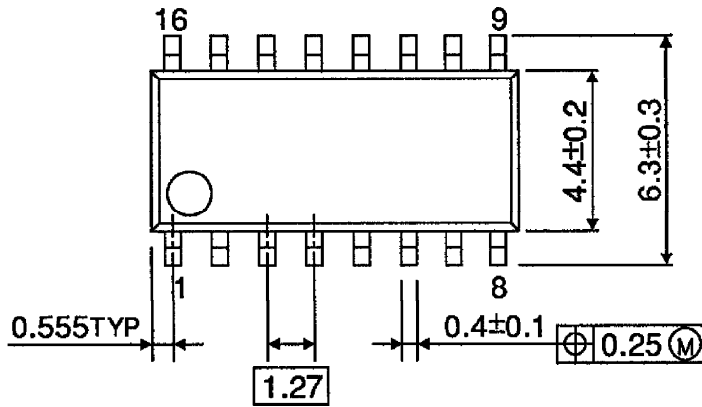
Unit : mm



Weight : 1.11g (Typ.)

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

Unit : mm



Weight : 0.16g (Typ.)