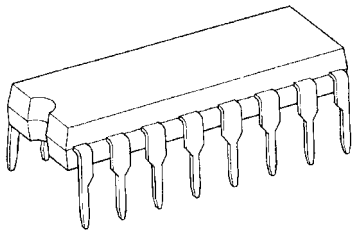
TOSHIBA BIPOLAR DIGITAL INTEGRATED CIRCUIT SILICON MONOLITHIC

TD62303P,TD62303F

6CH DIGIT DRIVER

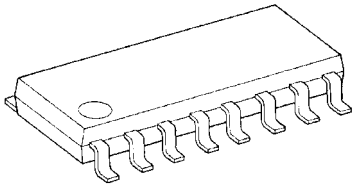
The TD62303P and TD62303F are comprised of six NPN low saturation drivers.
These devices are specifically designed for multiplexed digit driving of six digits common cathode LED displays. This device is intented for use with TTL and 5 V CMOS.

TD62303P



DIP16-P-300-2.54A

TD62303F



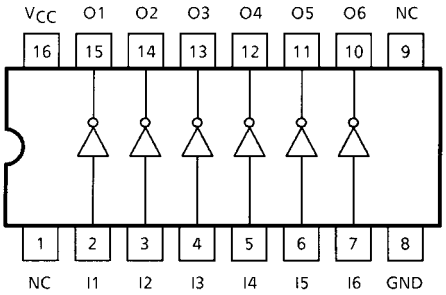
SOP16-P-225-1.27

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

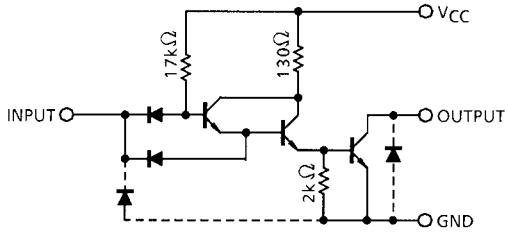
FEATURES

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

PIN CONNECTION (TOP VIEW)



SCHEMATICS (EACH DRIVER)



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

MAXIMUM RATINGS (Ta = 25°C)

CHARACTERISTICS		SYMBOL	RATING	UNIT
Supply Voltage		V_{CC}	−0.5~7.0	V
Output Sustaining Voltage		$V_{CE\ (SUS)}$	−0.5~17	V
Output Current		I_{OUT}	500	mA / ch
Input Voltage		V_{IN}	−0.5~V_{CC} + 0.5	V
Input Current		I_{IN}	−10	mA
Power Dissipation	P	P_D	1.0	W
	F		0.625 (Note)	
Operating Temperature	P	T_{opr}	−30~75	°C
	F		−40~85	
Storage Temperature		T_{stg}	−55~150	°C

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

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

CHARACTERISTIC		SYMBOL	CONDITION	MIN	TYP.	MAX	UNIT
Supply Voltage		V_{CC}	—	4.5	5.0	5.5	V
Output Sustaining Voltage		$V_{CE\ (SUS)}$	—	0	—	15	V
Output Current		I_{OUT}	DC 1 Circuit	0	—	350	mA / ch
Input Voltage		V_{IN}		0	—	V_{CC}	V
Power Dissipation	P	P_D	—	—	—	0.44	W
	F		(Note)	—	—	0.325	

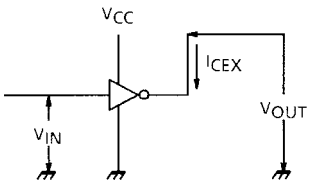
Note: On Glass Epoxy PCB (30 × 30 × 1.6 mm Cu 50%)

ELECTRICAL CHARACTERISTICS (Ta = 25°C)

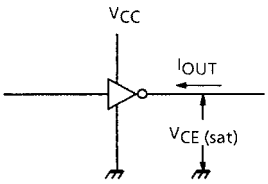
CHARACTERISTIC		SYMBOL	TEST CIR−CUIT	TEST CONDITION		MIN	TYP.	MAX	UNIT
Output Leakage Current	P	I_{CEX}	1	V_{CC} = 5.5 V, V_{IN} = 0 V, V_{OUT} = 15 V	Ta = 75°C	—	—	100	μA
	F				Ta = 85°C				
Output Saturation Voltage		$V_{CE\ (sat)}$	2	V_{CC} = 4.5 V, I_{OUT} = 150 mA		—	0.3	0.4	V
				V_{CC} = 4.5 V, I_{OUT} = 350 mA		—	0.65	0.8	
Input Current	Output On	$I_{IN\ (ON)}$	3	V_{CC} = 5.5 V, V_{IN} = 5.5 V		—	—	40	μA
	Output Off	$I_{IN\ (OFF)}$	4	V_{CC} = 5.5 V, V_{IN} = 0.4 V		—	—	−0.36	mA
Input Voltage	Output On	$V_{IN\ (ON)}$	5	—		—	—	2.0	V
	Output Off	$V_{IN\ (OFF)}$	5	—		0.8	—	—	
Supply Current		I_{CC}	6	V_{CC} = 5.5 V, V_{IN} = 5.5 V		—	—	47	mA / Gate
Turn−On Delay		t_{ON}	7	V_{CC} = 5.0 V, R_L = 37.5 Ω, V_{OUT} = 15 V, C_L = 15 pF		—	0.1	—	μs
Turn−Off Delay		t_{OFF}				—	0.7	—	μs

TEST CIRCUIT

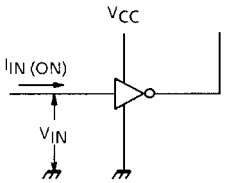
1. I_{CEX}



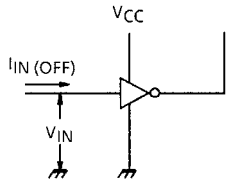
2. $V_{CE\ (sat)}$



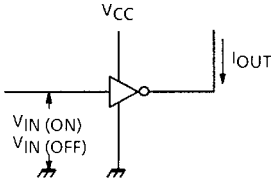
3. $I_{IN\ (ON)}$



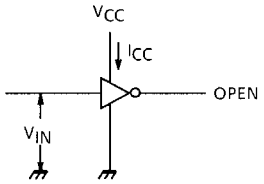
4. $I_{IN\ (OFF)}$



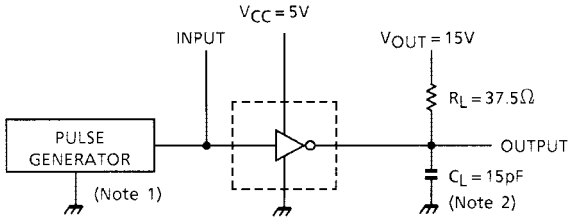
5. $V_{IN\ (ON)}$, V IN (OFF)

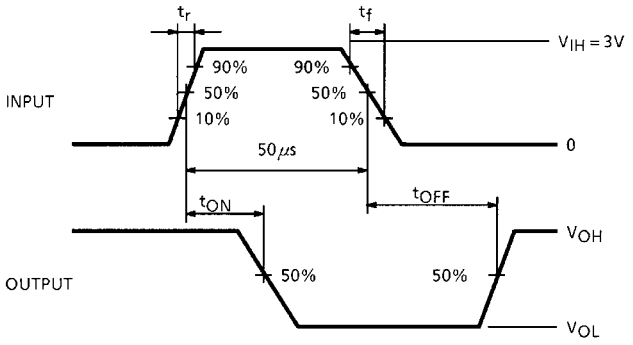


6. I_{CC}



7. t_{ON}, t_{OFF}



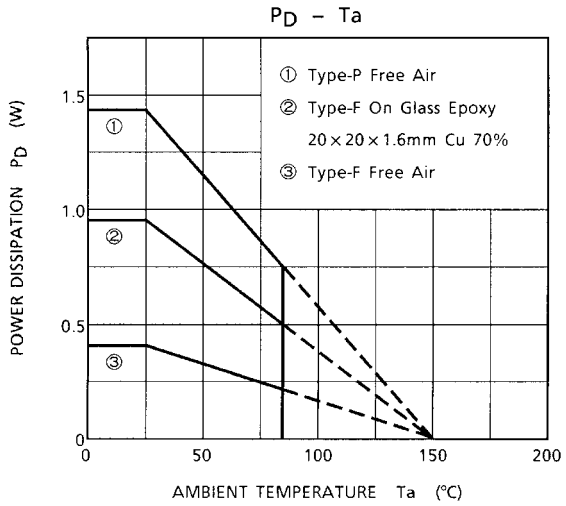


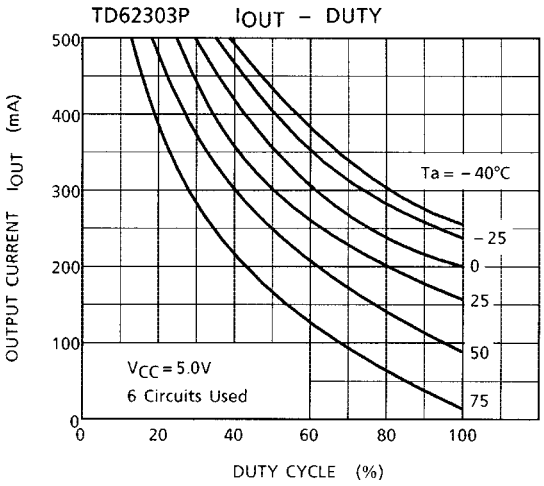
Note 1: Pulse Width 50 μs, duty cycle 10%
Output impedance 50 Ω, $t_r \leq 5$ ns, $t_f \leq 10$ ns

Note 2: C_L includes probe and jig capacitance.

PRECAUTIONS for USING

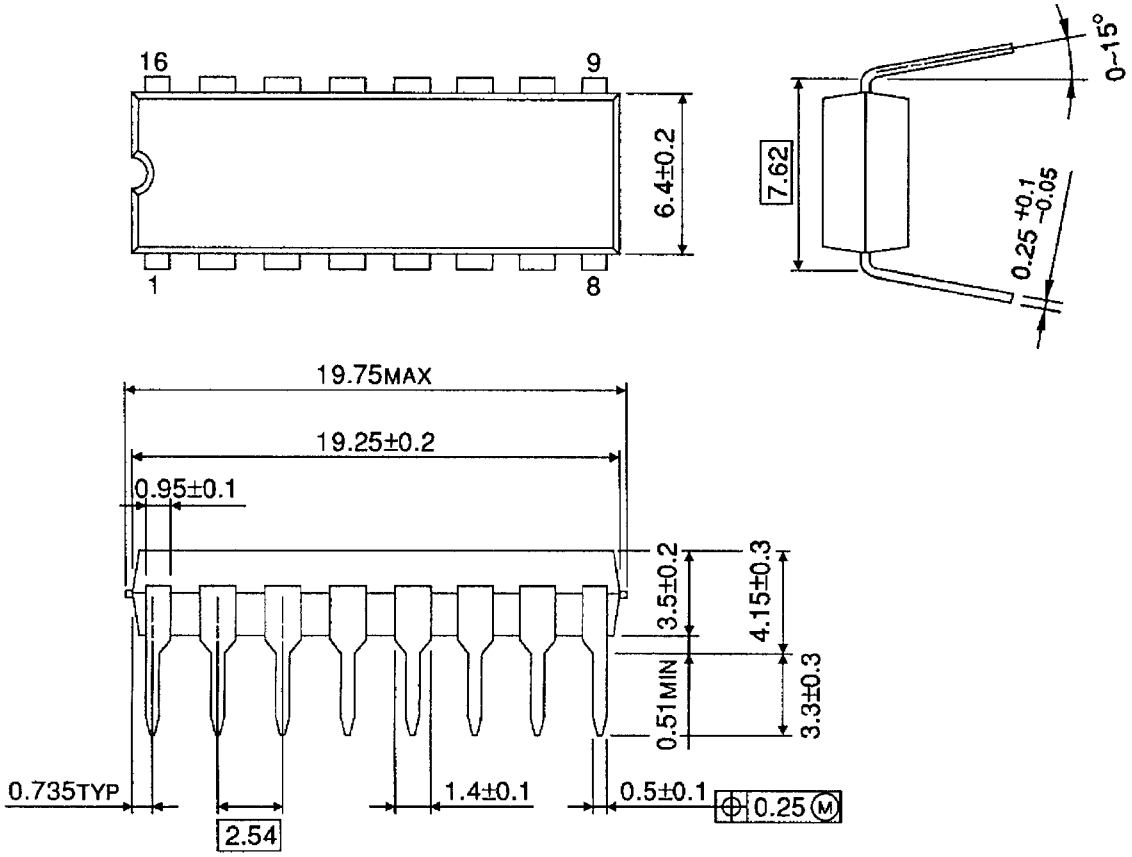
This IC does not include built-in protection circuits for excess current or overvoltage.
If this IC is subjected to excess current or overvoltage, it may be destroyed.
Hence, the utmost care must be taken when systems which incorporate this IC are designed.
Utmost care is necessary in the design of the 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.


P_D – Ta
① Type-P Free Air
② Type-F On Glass Epoxy
20 × 20 × 1.6mm Cu 70%
③ Type-F Free Air
POWER DISSIPATION P_D (W)
1.5
1.0
0.5
0
①
②
③
0
50
100
150
200
AMBIENT TEMPERATURE Ta (°C)


TD62303P I_{OUT} – DUTY
OUTPUT CURRENT I_{OUT} (mA)
500
400
300
200
100
0
Ta = – 40°C
– 25
0
25
50
75
V_{CC} = 5.0V
6 Circuits Used
0
20
40
60
80
100
DUTY CYCLE (%)

PACKAGE DIMENSIONS

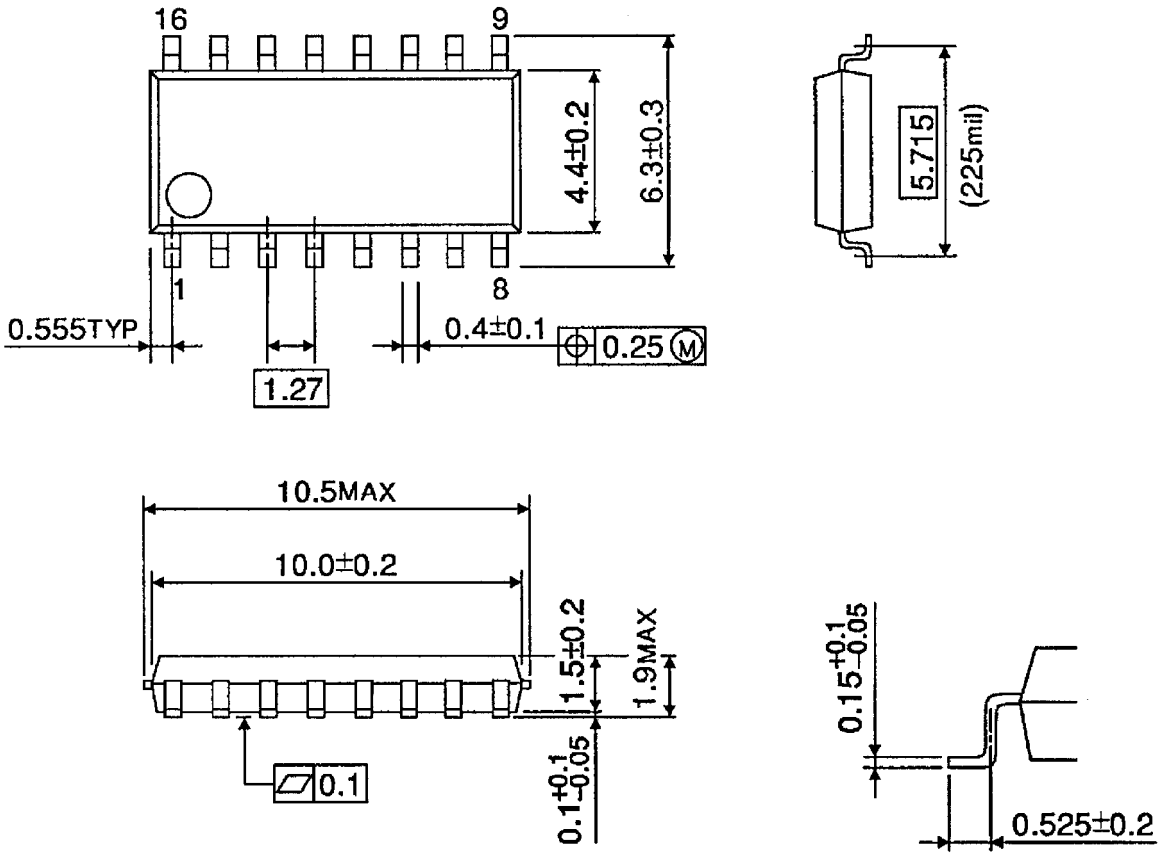
DIP16−P−300−2.54A Unit : mm



Weight: 1.11 g (Typ.)

PACKAGE DIMENSIONS

SOP16−P−225−1.27 Unit : mm



Weight: 0.16 g (Typ.)

RESTRICTIONS ON PRODUCT USE

000707EBA

- TOSHIBA is continually working to improve the quality and reliability of its products. Nevertheless, semiconductor devices in general can malfunction or fail due to their inherent electrical sensitivity and vulnerability to physical stress. It is the responsibility of the buyer, when utilizing TOSHIBA products, to comply with the standards of safety in making a safe design for the entire system, and to avoid situations in which a malfunction or failure of such TOSHIBA products could cause loss of human life, bodily injury or damage to property.
  In developing your designs, please ensure that TOSHIBA products are used within specified operating ranges as set forth in the most recent TOSHIBA products specifications. Also, please keep in mind the precautions and conditions set forth in the “Handling Guide for Semiconductor Devices,” or “TOSHIBA Semiconductor Reliability Handbook” etc..
- The TOSHIBA products listed in this document are intended for usage in general electronics applications (computer, personal equipment, office equipment, measuring equipment, industrial robotics, domestic appliances, etc.). These TOSHIBA products are neither intended nor warranted for usage in equipment that requires extraordinarily high quality and/or reliability or a malfunction or failure of which may cause loss of human life or bodily injury (“Unintended Usage”). Unintended Usage include atomic energy control instruments, airplane or spaceship instruments, transportation instruments, traffic signal instruments, combustion control instruments, medical instruments, all types of safety devices, etc.. Unintended Usage of TOSHIBA products listed in this document shall be made at the customer’s own risk.
- The products described in this document are subject to the foreign exchange and foreign trade laws.
- The information contained herein is presented only as a guide for the applications of our products. No responsibility is assumed by TOSHIBA CORPORATION for any infringements of intellectual property or other rights of the third parties which may result from its use. No license is granted by implication or otherwise under any intellectual property or other rights of TOSHIBA CORPORATION or others.
- The information contained herein is subject to change without notice.