

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 buffer-transistor output stages and PNP input stages.

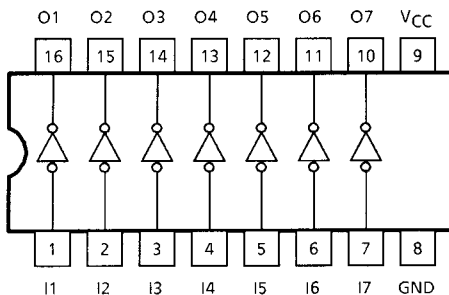
These devices can be operated by source input voltage and are suitable for operations with a 5-V general purposed logic IC such as 5-V TTL, 5-V CMOS and 5-V Microprocessor which have sink current output drivers.

Please observe the thermal condition for using.

### FEATURES

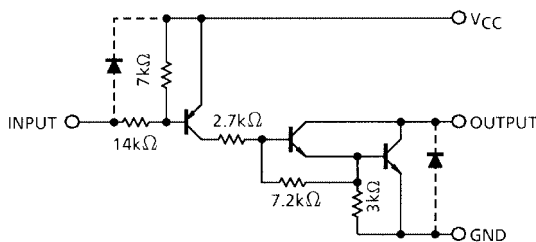
- Output current (single output) 500 mA (Max.)
- High sustaining voltage 35 V (TD62304P/F, 62305P/F) 50 V (TD62304AP/AF, 62305AP/AF) (Min.)
- Low level active input
- Input compatible with 5-V TTL and 5-V CMOS
- Package type-P, AP: DIP-16 pin
- Package type-F, AF: SOP-18 pin

### PIN CONNECTION (TOP VIEW)

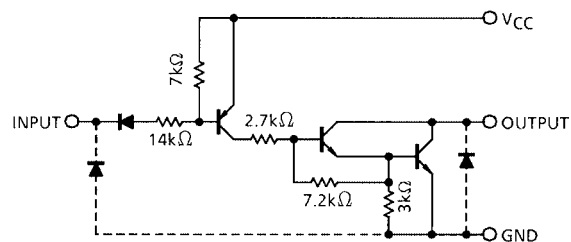


### SCHEMATICS (EACH DRIVER)

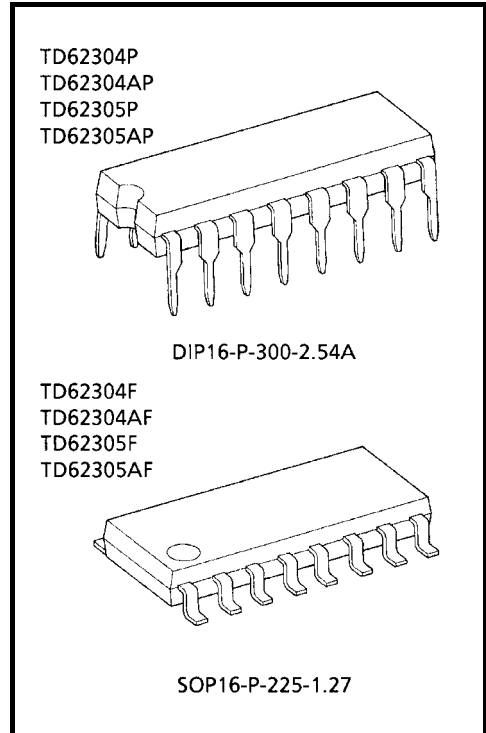
TD62304P/AP/F/AF



TD62305P/AP/F/AF



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



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

## MAXIMUM RATINGS (Ta = 25°C)

CHARACTERISTICS		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>	-55~150	°C

Note 1: TD62305P / AP / F / AF

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

## RECOMMENDED OPERATING CONDITIONS ( $T_a = -40\sim 85^\circ\text{C}$ and $T_a = -30\sim 75^\circ\text{C}$ 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	P, F	$V_{CE(SUS)}$	—	0	—	35	V
	AF			0	—	50	
	AP			0	—	50	
Output Current	P	$I_{OUT}$	DC 1 Circuit	0	—	350	mA / ch
			$T_{pw} = 25\text{ ms}$ , duty = 10% 7 circuits	0	—	300	
	AP		$T_{pw} = 25\text{ ms}$ , duty = 10% 7 circuits	0	—	350	
			$T_{pw} = 25\text{ ms}$ , duty = 20% 7 circuits	0	—	200	
Input Voltage	TD62304P / AP / F / AF	$V_{IN}$	—	-20	—	$V_{CC}$	V
	TD62305P / AP / F / AF			0	—	5.5	
Power Dissipation	P	$P_D$	—	—	—	0.44	W
	AP			—	—	0.52	
	F, AF			(Note 1)	—	—	

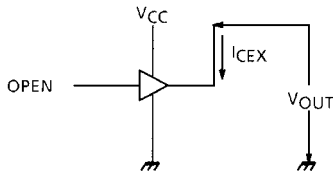
Note 1: On glass epoxy PCB (30 × 30 × 1.6 mm Cu 50%)

## ELECTRICAL CHARACTERISTICS ( $T_a = 25^\circ\text{C}$ )

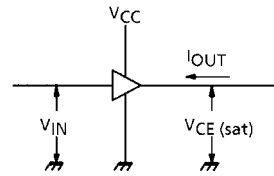
CHARACTERISTIC		SYMBOL	TEST CIRCUIT	TEST CONDITION	MIN	TYP.	MAX	UNIT	
Output Leakage Current	P / F	$I_{CEX}$	1	$V_{CC} = 5.5\text{ V}$ $V_{IN} = 0\text{ V}$	$V_{OUT} = 35\text{ V}$ $T_a = 75^\circ\text{C}$	—	—	-100	$\mu\text{A}$
					$V_{OUT} = 50\text{ V}$ $T_a = 85^\circ\text{C}$				
Output Saturation Voltage		$V_{CE(sat)}$	2	$V_{CC} = 4.5\text{ V}$ $I_{OUT} = 350\text{ mA}$	$V_{IN} = V_{IN(ON)}$ MAX.	—	1.4	2.0	V
Input Current	(Output On)	$I_{IN(ON)}$	3	$V_{CC} = 5.5\text{ V}$ , $V_{IN} = 0.4\text{ V}$	—	-0.32	-0.45	mA	
	(Output Off)	$I_{IN(OFF)}$	4	—	—	—	-2.6		$\mu\text{A}$
Input Voltage (Output On)	TD62304	$V_{IN(ON)}$	5	—	—	—	$V_{CC}$ -2.8	V	
	TD62305				—	—	$V_{CC}$ -3.7		
Supply Current	(Output On)	$I_{CC(ON)}$	6	$V_{CC} = 5.5\text{ V}$ , $V_{IN} = 0\text{ V}$	—	17	22	mA	
	(Output Off)	$I_{CC(OFF)}$	6	$V_{CC} = V_{IN} = 5.5\text{ V}$	—	—	100	$\mu\text{A}$	
Turn-On Delay	P, F	$t_{ON}$	7	$V_{CC} = 5\text{ V}$ , $C_L = 15\text{ pF}$	$V_{OUT} = 35\text{ V}$ $R_L = 87.5\ \Omega$	—	0.1	—	$\mu\text{s}$
	AP, AF				$V_{OUT} = 50\text{ V}$ $R_L = 125\ \Omega$				
Turn-Off Delay	P, F	$t_{OFF}$			$V_{OUT} = 35\text{ V}$ $R_L = 87.5\ \Omega$	—	3	—	
	AP, AF				$V_{OUT} = 50\text{ V}$ $R_L = 125\ \Omega$				

## TEST CIRCUIT

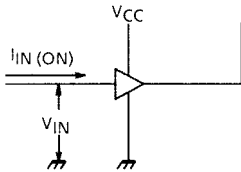
### 1. $I_{CEX}$



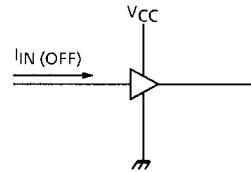
### 2. $h_{FE}$ , $V_{CE(sat)}$



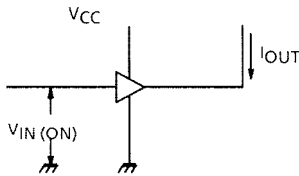
### 3. $I_{IN(ON)}$



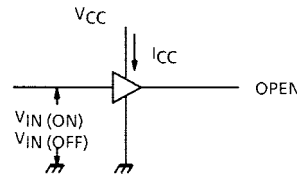
### 4. $I_{IN(OFF)}$



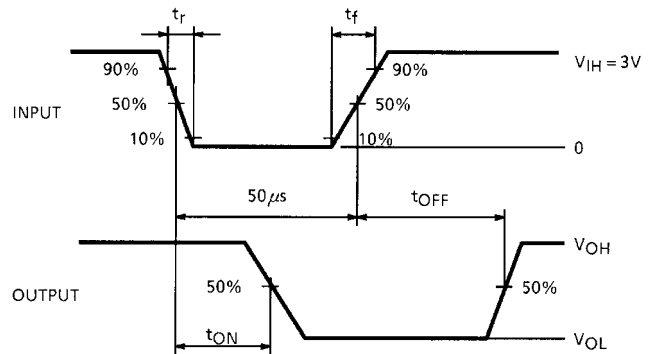
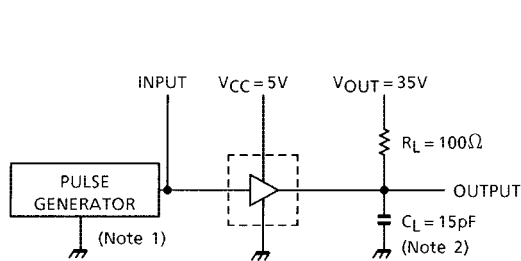
### 5. $V_{IN(ON)}$



### 6. $I_{CC}$



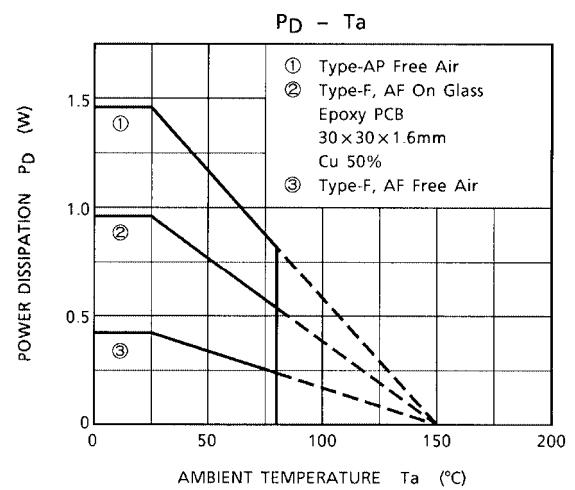
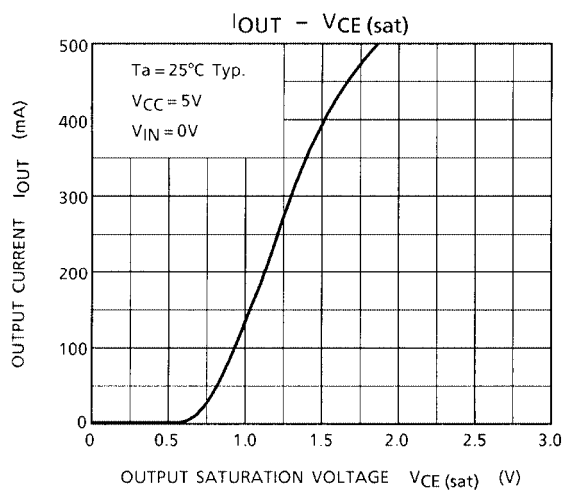
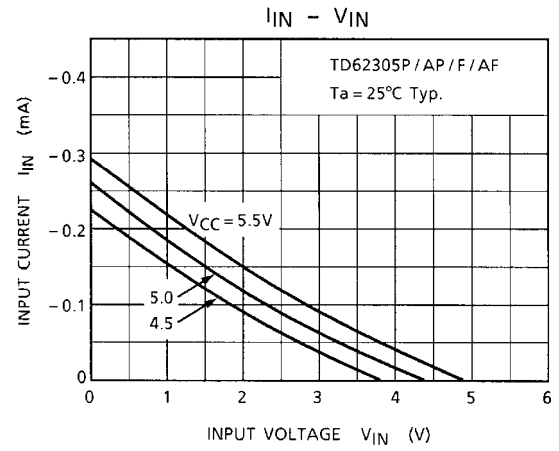
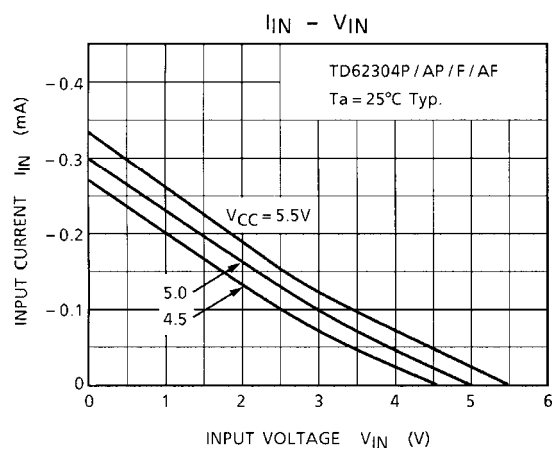
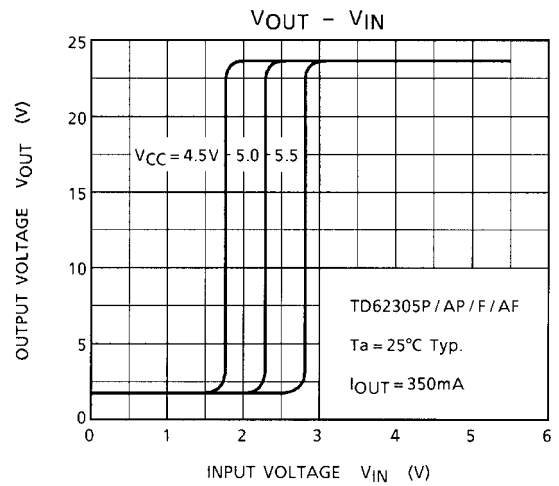
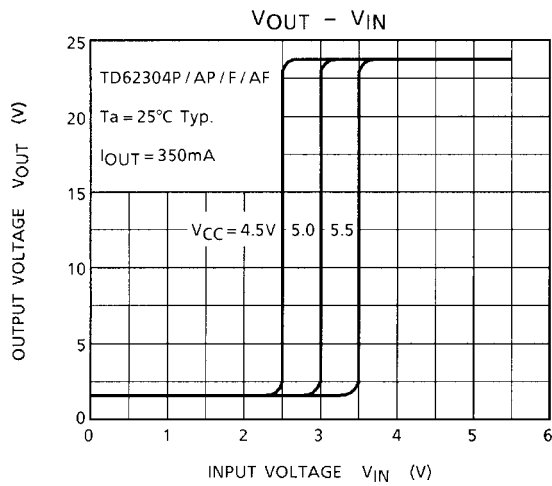
### 7. $t_{ON}$ , $t_{OFF}$

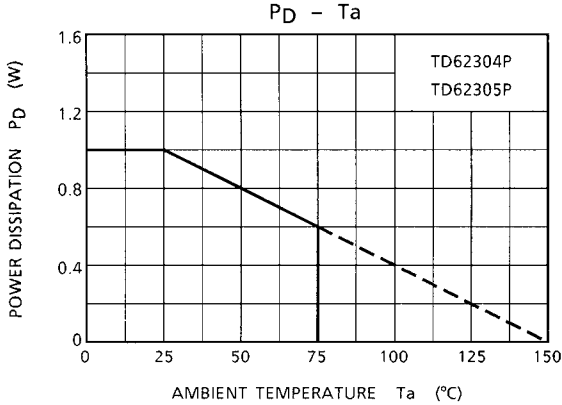


- Note 1: Pulse Width 50  $\mu$ s, duty cycle 10%  
 Output impedance 50  $\Omega$ ,  $t_r \leq 10$  ns,  $t_f \leq 5$  ns  
 Note 2:  $C_L$  includes probe and jig capacitance.

## 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, VCC and GND line since IC may be destroyed due to short-circuit between outputs, air contamination fault, or fault by improper grounding.

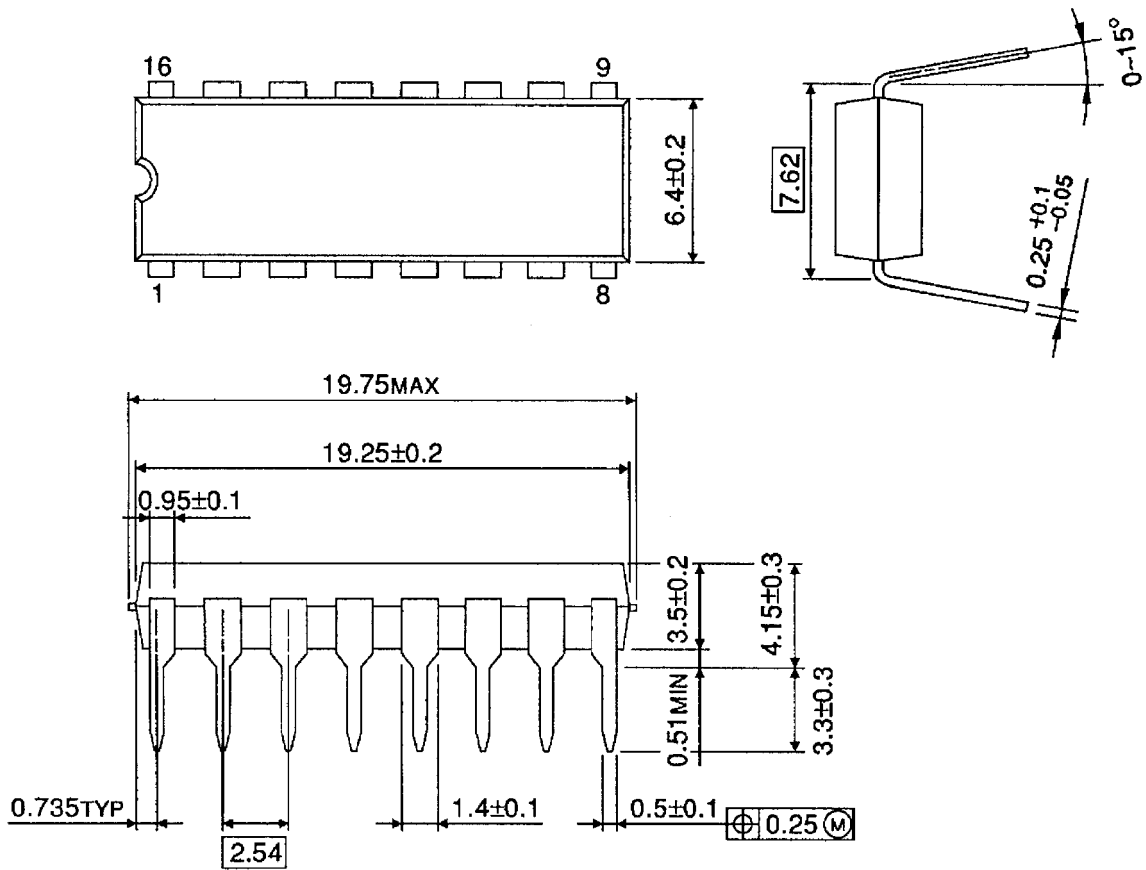




## PACKAGE DIMENSIONS

DIP16-P-300-2.54A

Unit : mm

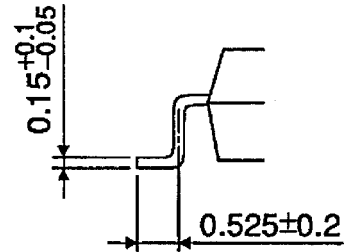
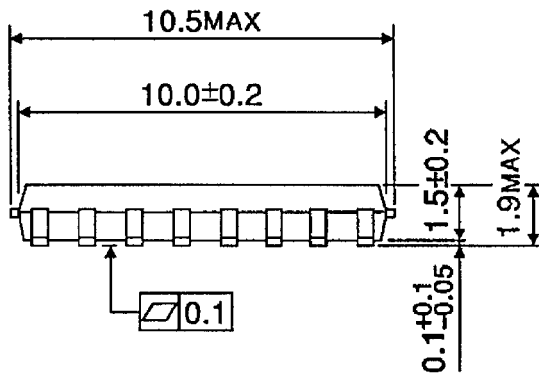
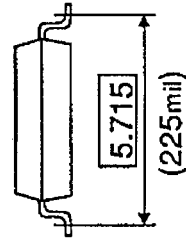
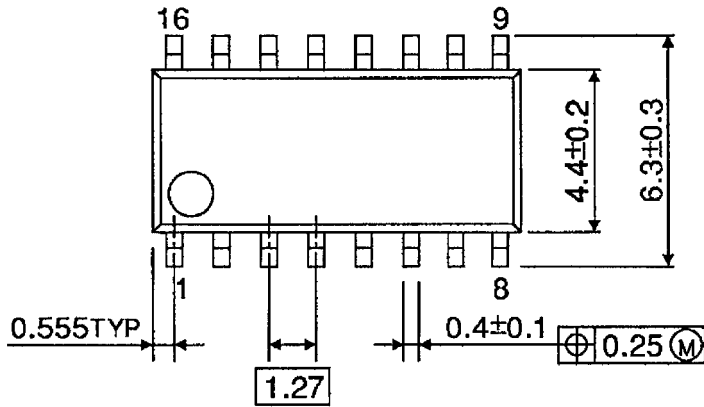


Weight: 1.11 g (Typ.)

**PACKAGE DIMENSIONS**

SOP16-P-225-1.27

Unit : mm



Weight: 0.16 g (Typ.)



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000707EBA

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