

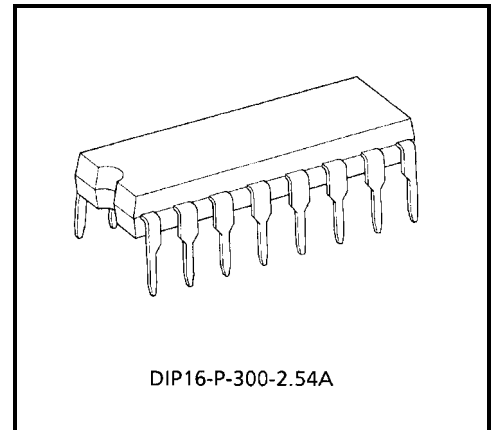
## TD62003PA, TD62003APA, TD62004PA, TD62004APA

### 7CH DARLINGTON SINK DRIVER

The TD62003PA / APA Series are high-voltage, high-current darlington drivers comprised of seven NPN darlington pairs. All units feature integral clamp diodes for switching inductive loads. Applications include relay, hammer, lamp and display (LED) drivers.

### FEATURES

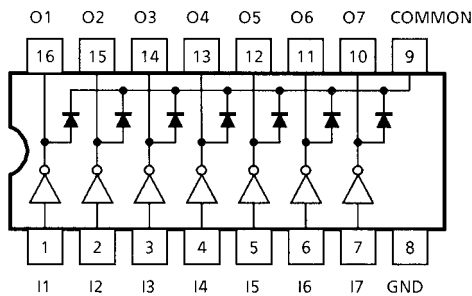
- Output current (single output) 500 mA (Max.)
- High sustaining voltage output  
35 V (Min.) (TD62003PA series)  
50 V (Min.) (TD62003APA series)
- Output clamp diodes
- Inputs compatible with various types of logic.  
TD62003PA, APA  $R_{IN} = 2.7 \text{ k}\Omega$   
TD62004PA, APA  $R_{IN} = 10.5 \text{ k}\Omega$
- Package DIP-16 pin



DIP16-P-300-2.54A

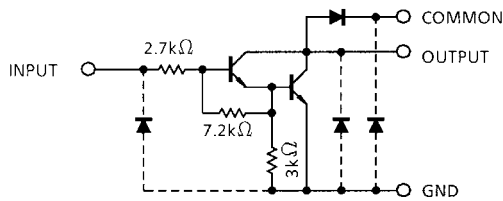
Weight: 1.11g (Typ.)

### PIN CONNECTION (TOP VIEW)

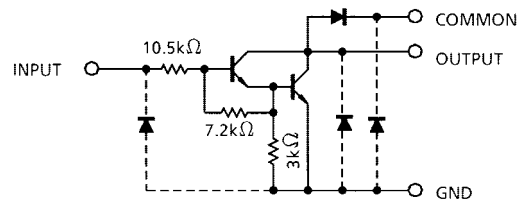


## SCHEMATICS (EACH DRIVER)

TD62003PA / APA



TD62004PA / APA



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

## MAXIMUM RATINGS (Ta = 25°C)

CHARACTERISTIC		SYMBOL	RATING	UNIT
Output Sustaining Voltage	PA	V <sub>CE (SUS)</sub>	-0.5~35	V
	APA		-0.5~50	
Output Current		I <sub>OUT</sub>	500	mA / ch
Input Voltage		V <sub>IN</sub>	-0.5~30	V
Clamp Diode Reverse Voltage	PA	V <sub>R</sub>	35	V
	APA		50	
Clamp Diode Forward Current		I <sub>F</sub>	500	mA
Power Dissipation		P <sub>D</sub>	1.47	W
Operating Temperature	PA	T <sub>opr</sub>	-30~75	°C
	APA		-40~85	
Storage Temperature		T <sub>stg</sub>	-55~150	°C

## RECOMMENDED OPERATING CONDITIONS

(Ta = -40~85°C for Type-APA and Ta = -30~75°C for Type-PA)

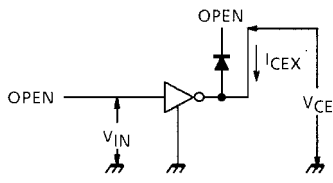
CHARACTERISTIC		SYMBOL	CONDITION	MIN	TYP.	MAX	UNIT	
Output Sustaining Voltage	PA	V <sub>CE (SUS)</sub>		0	—	35	V	
	APA			0	—	50		
Output Current	PA	I <sub>OUT</sub>	T <sub>pw</sub> = 25 ms 7 Circuits	Duty = 10%	0	—	370	mA / ch
				Duty = 50%	0	—	140	
	APA			Duty = 10%	0	—	400	
				Duty = 50%	0	—	170	
Input Voltage		V <sub>IN</sub>		0	—	24	V	
	TD62003	V <sub>IN (ON)</sub>	I <sub>OUT</sub> = 400 mA, h <sub>FE</sub> = 800	2.8	—	24	V	
				6.2	—	24		
	TD62004	V <sub>IN (OFF)</sub>		0	—	0.7	V	
			0	—	1.0			
Clamp Diode Reverse Voltage	PA	V <sub>R</sub>		—	—	35	V	
	APA			—	—	50		
Clamp Diode Forward Current		I <sub>F</sub>		—	—	350	mA	
Power Dissipation		P <sub>D</sub>	Ta = 85°C	—	—	0.52	W	

## ELECTRICAL CHARACTERISTICS (Ta = 25°C)

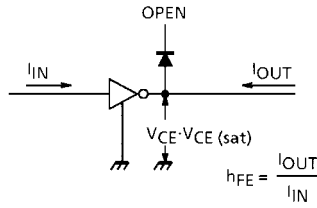
CHARACTERISTIC		SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN	TYP.	MAX	UNIT	
Output Leakage Current	APA	$I_{CEX}$	1	$V_{CE} = 50\text{ V}, T_a = 25^\circ\text{C}$	—	—	50	$\mu\text{A}$	
				$V_{CE} = 50\text{ V}, T_a = 85^\circ\text{C}$	—	—	100		
	PA			$V_{CE} = 35\text{ V}, T_a = 25^\circ\text{C}$	—	—	50		
				$V_{CE} = 35\text{ V}, T_a = 75^\circ\text{C}$	—	—	100		
Collector–Emitter Saturation Voltage		$V_{CE(sat)}$	2	$I_{OUT} = 350\text{ mA}, I_{IN} = 500\text{ }\mu\text{A}$	—	1.3	1.6	V	
				$I_{OUT} = 200\text{ mA}, I_{IN} = 350\text{ }\mu\text{A}$	—	1.1	1.3		
				$I_{OUT} = 100\text{ mA}, I_{IN} = 250\text{ }\mu\text{A}$	—	0.9	1.1		
DC Current Transfer Ratio		$h_{FE}$	2	$V_{CE} = 2\text{ V}, I_{OUT} = 350\text{ mA}$	1000	—	—		
Input Current (Output On)	TD62003	$I_{IN(ON)}$	3	$V_{IN} = 2.4\text{ V}, I_{OUT} = 350\text{ mA}$	—	0.4	0.7	mA	
	TD62004			$V_{IN} = 9.5\text{ V}, I_{OUT} = 350\text{ mA}$	—	0.8	1.3		
	PA	$I_{IN(OFF)}$	4	$I_{OUT} = 500\text{ }\mu\text{A}, T_a = 75^\circ\text{C}$	50	65	—	$\mu\text{A}$	
	APA			$I_{OUT} = 500\text{ }\mu\text{A}, T_a = 85^\circ\text{C}$	50	65	—		
Input Voltage (Output On)	TD62003	$V_{IN(ON)}$	5	$V_{CE} = 2\text{ V}$ $h_{FE} = 800$	$I_{OUT} = 350\text{ mA}$	—	—	2.6	V
					$I_{OUT} = 200\text{ mA}$	—	—	2.0	
	TD62004				$I_{OUT} = 350\text{ mA}$	—	—	4.7	
					$I_{OUT} = 200\text{ mA}$	—	—	4.4	
Clamp Diode Reverse Current	APA	$I_R$	6	$V_R = 50\text{ V}, T_a = 25^\circ\text{C}$	—	—	50	$\mu\text{A}$	
				$V_R = 50\text{ V}, T_a = 85^\circ\text{C}$	—	—	100		
	PA			$V_R = 35\text{ V}, T_a = 25^\circ\text{C}$	—	—	50		
				$V_R = 35\text{ V}, T_a = 75^\circ\text{C}$	—	—	100		
Clamp Diode Forward Voltage		$V_F$	7	$I_F = 350\text{ mA}$	—	—	2.0	V	
Input Capacitance		$C_{IN}$	—		—	15	—	pF	
Turn–On Delay	PA	$t_{ON}$	8	$V_{OUT} = 35\text{ V}, R_L = 85\text{ }\Omega$ $C_L = 15\text{ pF}$	—	0.1	—	$\mu\text{s}$	
	APA			$V_{OUT} = 50\text{ V}, R_L = 125\text{ }\Omega$ $C_L = 15\text{ pF}$	—	0.1	—		
Turn–Off Delay	PA	$t_{OFF}$	8	$V_{OUT} = 35\text{ V}, R_L = 85\text{ }\Omega$ $C_L = 15\text{ pF}$	—	0.2	—		
	APA			$V_{OUT} = 50\text{ V}, R_L = 125\text{ }\Omega$ $C_L = 15\text{ pF}$	—	0.2	—		

**TEST CIRCUIT**

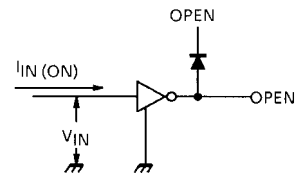
**1.  $I_{CEX}$**



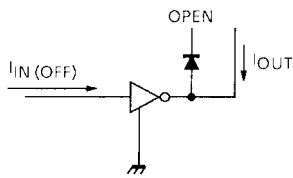
**2.  $V_{CE(sat)}$ ,  $h_{FE}$**



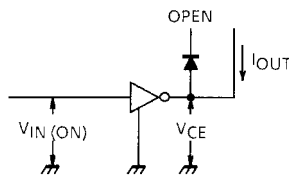
**3.  $I_{IN(ON)}$**



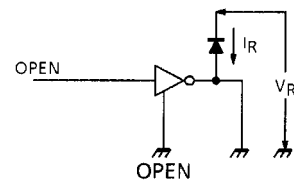
**4.  $I_{IN(OFF)}$**



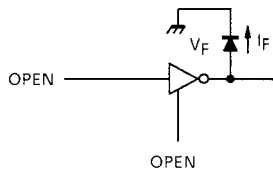
**5.  $V_{IN(ON)}$**



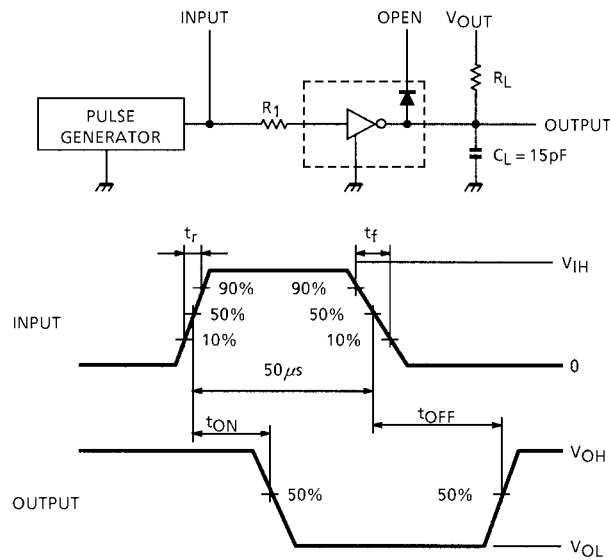
**6.  $I_R$**



**7.  $V_F$**



**8.  $t_{ON}$ ,  $t_{OFF}$**



Note 1: Pulse Width 50  $\mu$ s, Duty Cycle 10%  
 Output Impedance 50  $\Omega$ ,  $t_r \leq 5$ ns,  $t_f \leq 10$ ns

Note 2: See below

**INPUT CONDITION**

TYPE NUMBER	$R_I$	$V_{IH}$
TD620003PA / APA	0	3 V
TD620004 / APA	0	8 V

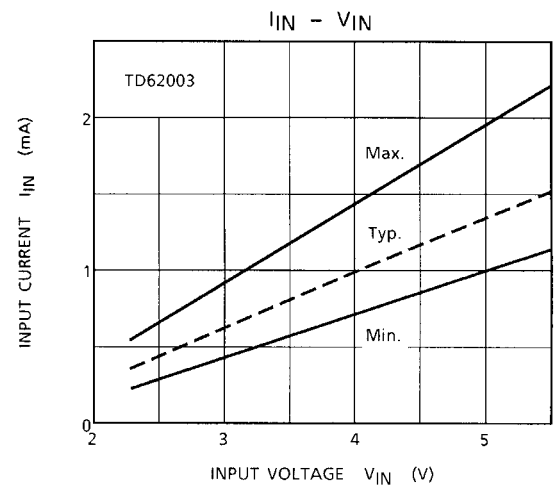
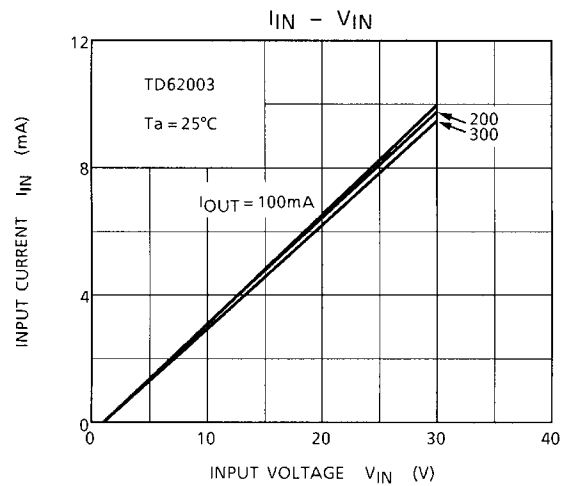
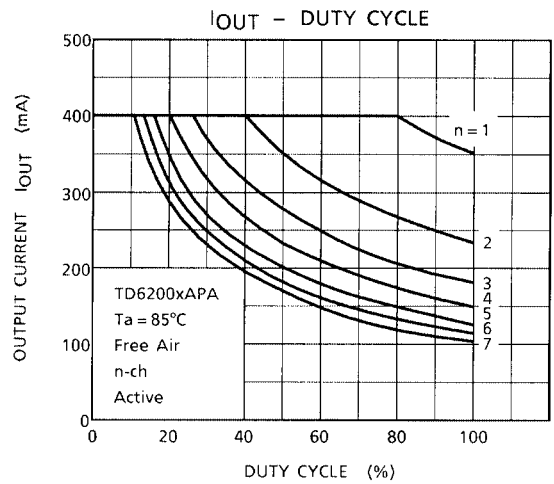
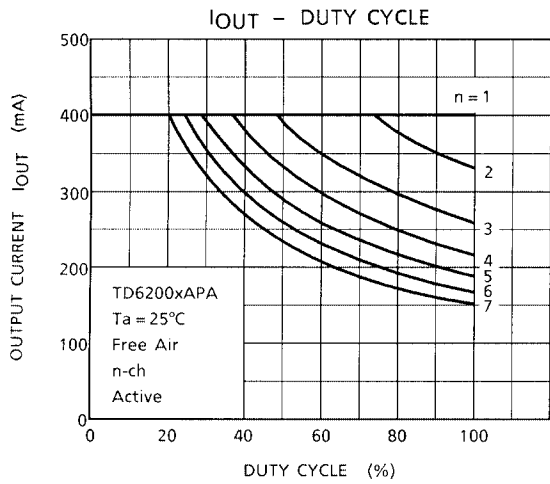
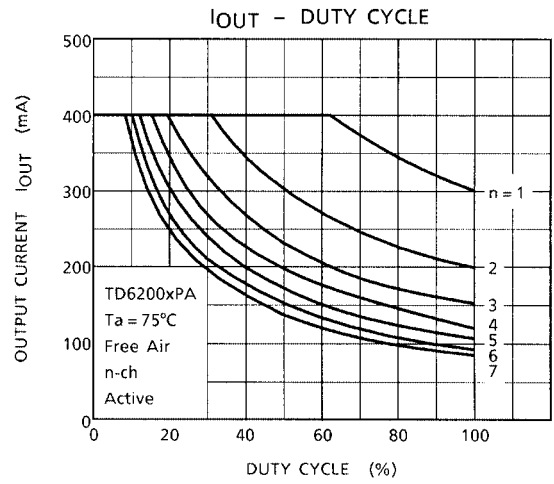
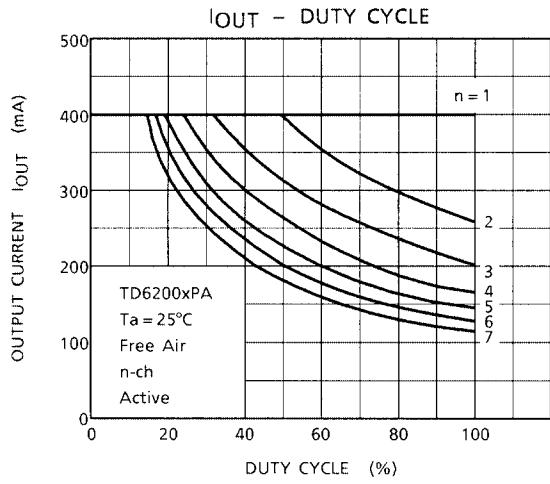
Note 3:  $C_L$  includes probe and jig capacitance

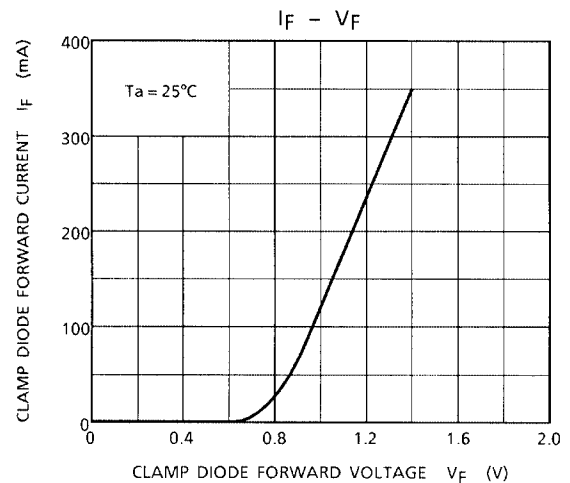
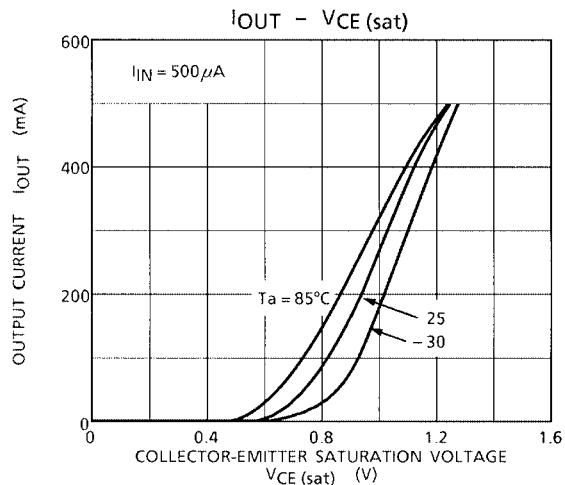
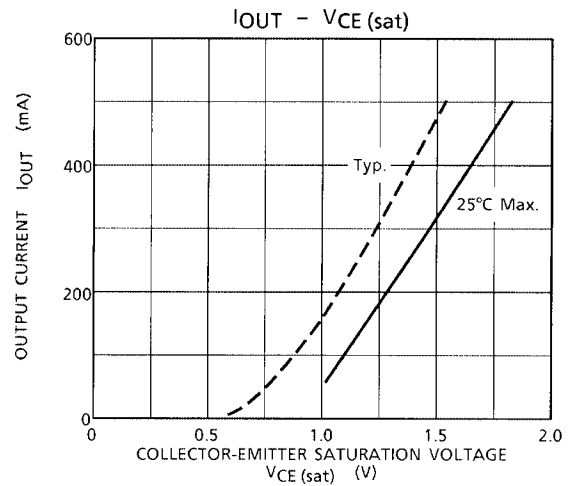
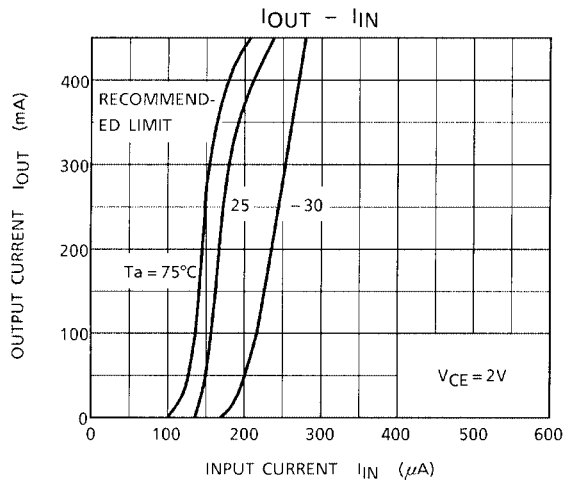
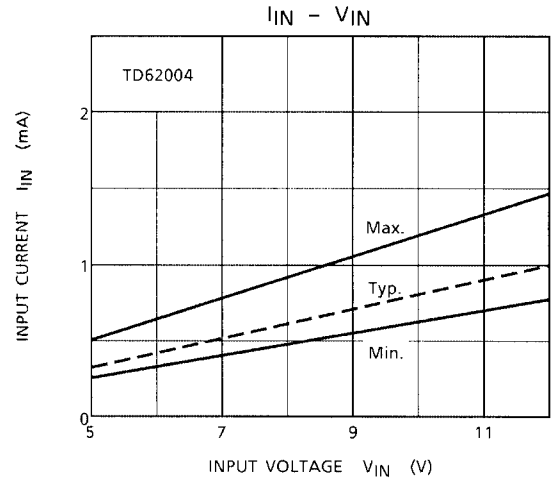
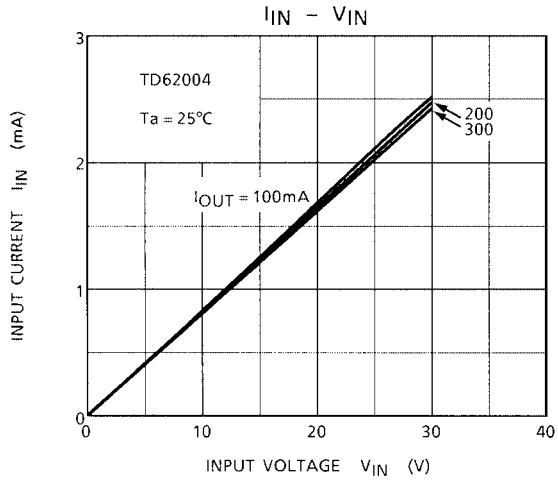
**PRECAUTIONS for USING**

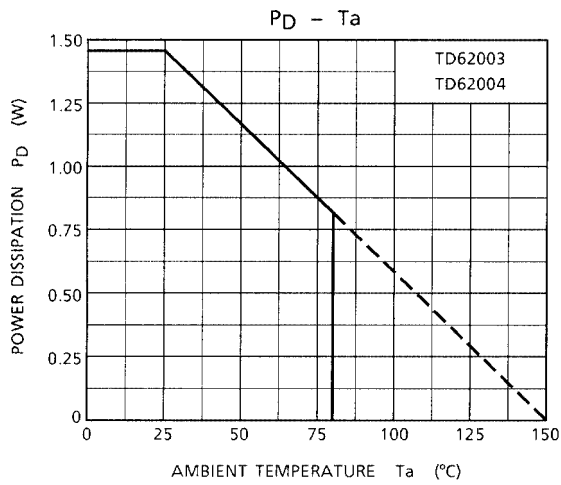
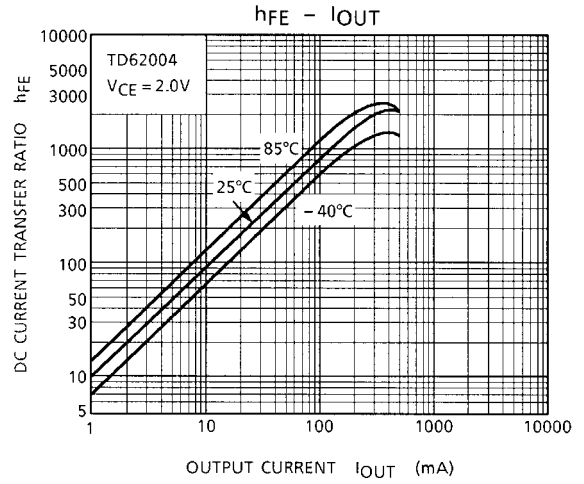
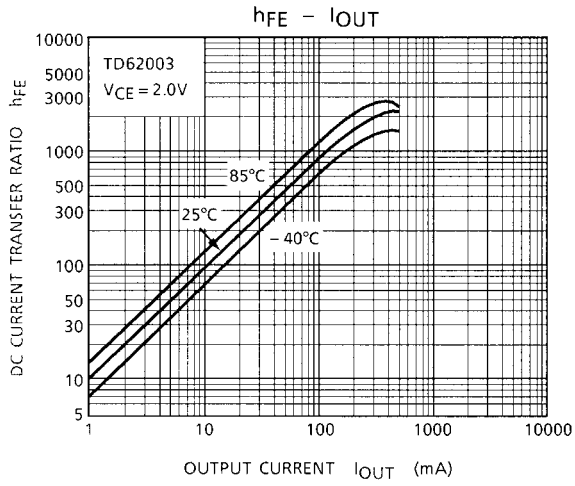
This IC does not include built-in protection circuits for excess current or overvoltage.

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





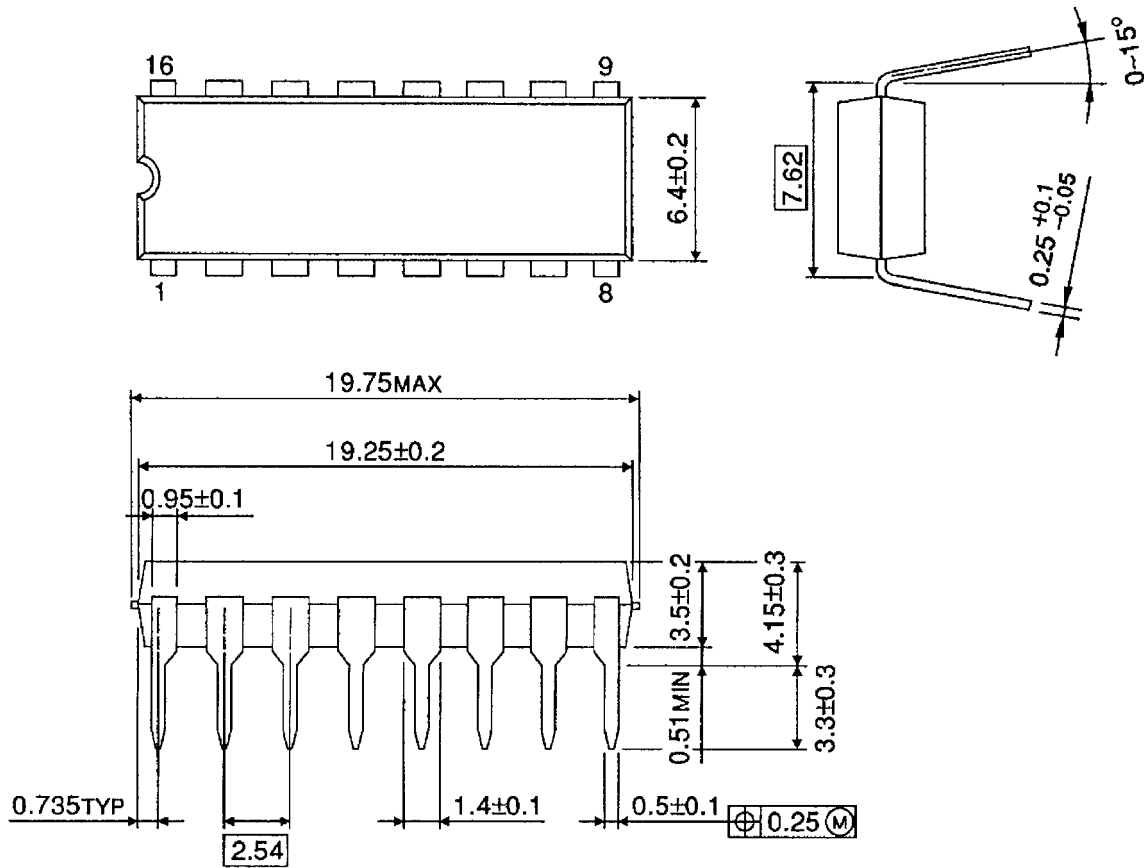




## PACKAGE DIMENSIONS

DIP16-P-300-2.54A

Unit : mm



Weight: 1.11 g (Typ.)

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000707EBA

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