

TOSHIBA Bipolar Digital Integrated Circuit Silicon Monolithic

**TD62001APG, TD62001AFG, TD62002APG, TD62002AFG,
TD62003APG, TD62003AFG, TD62004APG, TD62004AFG**

7-channel Darlington Sink Driver

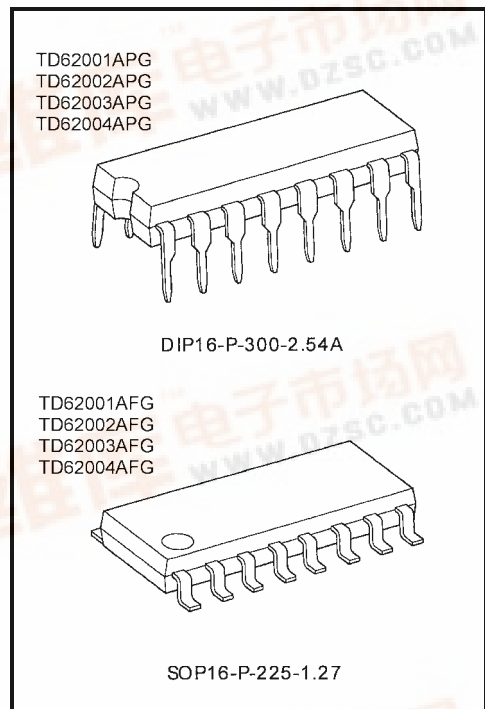
The TD62001APG/AFG Series are high-voltage, high-current darlington drivers comprised of seven NPN darlington pairs. All units feature integral clamp diodes for switching inductive loads.

Applications include relay, hammer, lamp and display (LED) drivers.

Features

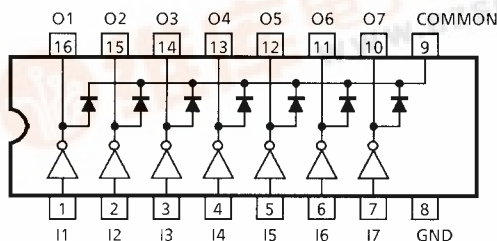
- Output current (single output): 500 mA (max)
- High sustaining voltage output: 50 V (min)
- Output clamp diodes
- Inputs compatible with various types of logic
- Package type
 - APG: DIP-16 pin (Pb free package)
 - AFG: SOP-16 pin (Pb free package)

Type	Input base resistor	Designation
TD62001APG/AFG	External	General purpose
TD62002APG/AFG	10.5-kΩ + 7-V Zener diode	14-V to 25-V PMOS
TD62003APG/AFG	2.7 kΩ	TTL, 5-V CMOS
TD62004APG/AFG	10.5 kΩ	6-V to 15-V PMOS, CMOS



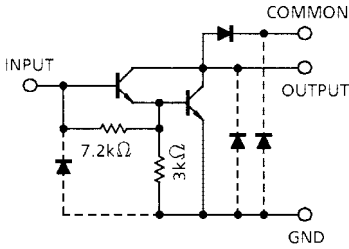
Weight
 DIP16-P-300-2.54A : 1.11 g (Typ.)
 SOP16-P-225-1.27 : 0.16 g (Typ.)

Pin Connection (top view)

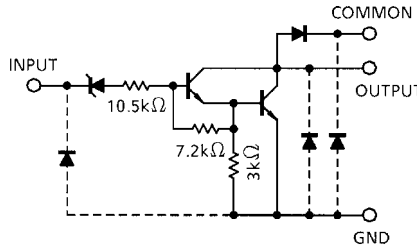


Schematics (each driver)

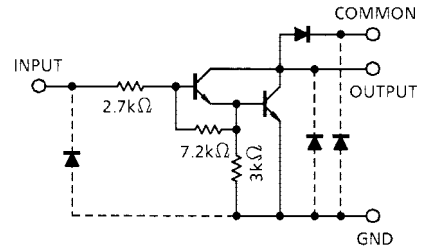
TD62001APG/AFG



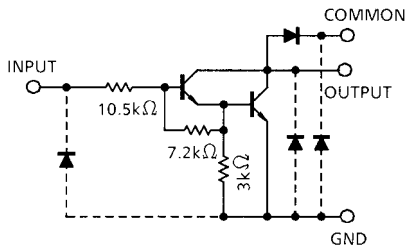
TD62002APG/AFG



TD62003PAPG/AFG



TD62004APG/AFG



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

Maximum Ratings (Ta = 25°C)

Characteristics	Symbol	Rating	Unit
Output sustaining voltage	$V_{CE(SUS)}$	-0.5 to 50	V
Output current	I_{OUT}	500	mA/ch
Input voltage	V_{IN} (Note 1)	-0.5 to 30	V
Input current	I_{IN} (Note 2)	25	mA
Clamp diode reverse voltage	V_R	50	V
Clamp diode forward current	I_F	500	mA
Power dissipation	APG	1.47	W
	AFG	0.625 (Note 3)	
Operating temperature	T_{opr}	-40 to 85	°C
Storage temperature	T_{stg}	-55 to 150	°C

Note 1: Except TD62001APG/AFG

Note 2: Only TD62001APG/AFG

Note 3: When mounted on a glass-epoxy PCB (30 mm × 30 mm × 1.6 mm, Cu area: 50%)

Recommended Operating Conditions (Ta = -40°C to 85°C)

Characteristics		Symbol	Condition	Min	Typ.	Max	Unit	
Output sustaining voltage		$V_{CE(SUS)}$		0	—	50	V	
Output current	APG	I_{OUT}	$T_{pw} = 25\text{ ms}$ 7 circuits $T_a = 85^\circ\text{C}$ $T_j = 120^\circ\text{C}$	Duty = 10%	0	—	370	mA/ch
				Duty = 50%	0	—	130	
	AFG			Duty = 10%	0	—	233	
				Duty = 50%	0	—	70	
Input voltage	Except TD62001APG/AFG	V_{IN}		0	—	24	V	
Input voltage (output on)	TD62002	$V_{IN(ON)}$	$I_{OUT} = 400\text{ mA}$ $h_{FE} = 800$	14.5	—	24	V	
	TD62003			2.8	—	24		
	TD62004			6.2	—	24		
Input voltage (output off)	TD62001	$V_{IN(OFF)}$		0	—	0.6	V	
	TD62002			0	—	7.4		
	TD62003			0	—	0.7		
	TD62004			0	—	1.0		
Input current	Only TD62001	I_{IN}		0	—	10	mA	
Clamp diode reverse voltage		V_R		—	—	50	V	
Clamp diode forward current		I_F		—	—	350	mA	
Power dissipation	APG	P_D	$T_a = 85^\circ\text{C}$	—	—	0.76	W	
	AFG		$T_a = 85^\circ\text{C}$ (Note)	—	—	0.325		

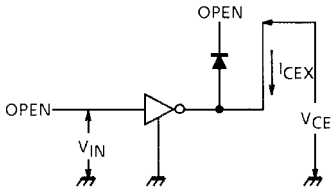
Note: When mounted on a glass-epoxy PCB (30 mm × 30 mm × 1.6 mm, Cu area: 50%)

Electrical Characteristics (Ta = 25°C unless otherwise noted)

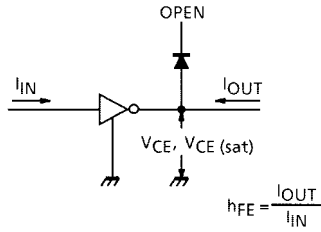
Characteristics	Symbol	Test Circuit	Test Condition	Min	Typ.	Max	Unit		
Output leakage current	I_{CEX}	1	$V_{CE} = 50\text{ V}, T_a = 25^\circ\text{C}$	—	—	50	μA		
			$V_{CE} = 50\text{ V}, T_a = 85^\circ\text{C}$	—	—	100			
Collector-emitter saturation voltage	$V_{CE(sat)}$	2	$I_{OUT} = 350\text{ mA}, I_{IN} = 500\text{ }\mu\text{A}$	—	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)	TD62002	$I_{IN(ON)}$	3	$V_{IN} = 20\text{ V}, I_{OUT} = 350\text{ mA}$	—	1.1	1.7	mA	
	TD62003				$V_{IN} = 2.4\text{ V}, I_{OUT} = 350\text{ mA}$	—	0.4		0.7
	TD62004				$V_{IN} = 9.5\text{ V}, I_{OUT} = 350\text{ mA}$	—	0.8		1.2
Input current (output off)	$I_{IN(OFF)}$	4	$I_{OUT} = 500\text{ }\mu\text{A}, T_a = 85^\circ\text{C}$	50	65	—	μA		
Input voltage (output on)	TD62002	$V_{IN(ON)}$	5	$V_{CE} = 2\text{ V}$ $h_{FE} = 800$	$I_{OUT} = 350\text{ mA}$	—	—	13.7	V
					$I_{OUT} = 200\text{ mA}$	—	—	11.4	
	TD62003				$I_{OUT} = 350\text{ mA}$	—	—	2.6	
					$I_{OUT} = 200\text{ mA}$	—	—	2.0	
	TD62004				$I_{OUT} = 350\text{ mA}$	—	—	4.7	
					$I_{OUT} = 200\text{ mA}$	—	—	4.4	
Clamp diode reverse current	I_R	6	$V_R = 50\text{ V}, T_a = 25^\circ\text{C}$	—	—	50	μA		
			$V_R = 50\text{ V}, T_a = 85^\circ\text{C}$	—	—	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	t_{ON}	8	$V_{OUT} = 50\text{ V}, R_L = 125\text{ }\Omega$ $C_L = 15\text{ pF}$	—	0.1	—	μs		
Turn-off delay	t_{OFF}	8	$V_{OUT} = 50\text{ V}, R_L = 125\text{ }\Omega$ $C_L = 15\text{ pF}$	—	0.2	—			

Test Circuit

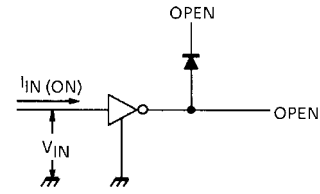
1. I_{CEX}



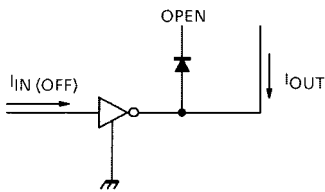
2. $V_{CE} (sat), h_{FE}$



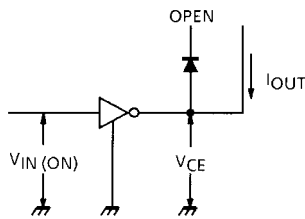
3. $I_{IN} (ON)$



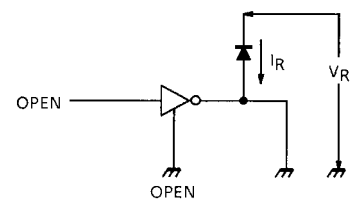
4. $I_{IN} (OFF)$



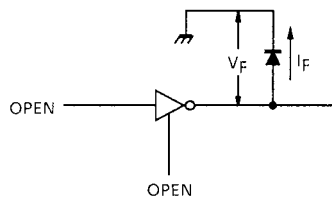
5. $V_{IN} (ON)$



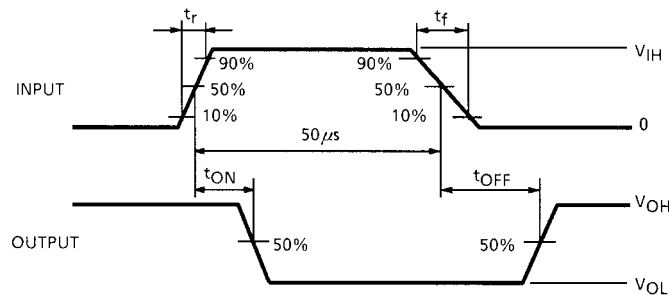
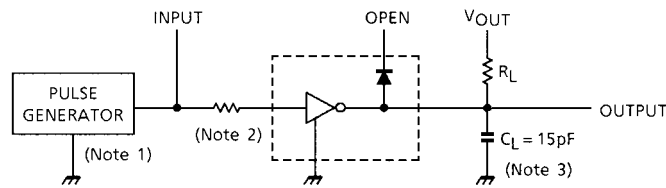
6. I_R



7. V_F



8. t_{ON} , t_{OFF}



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

Note 2: Input conditions are shown as following:

Input Condition

Type Number	R1	V _{IH}
TD62001APG/AFG	2.7 k Ω	3 V
TD62002APG/AFG	0	13 V
TD62003APG/AFG	0	3 V
TD62004APG/AFG	0	8 V

Note 3: C_L includes probe and jig capacitance.

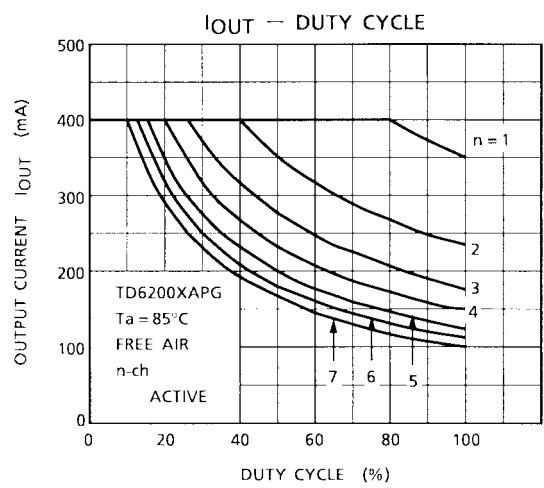
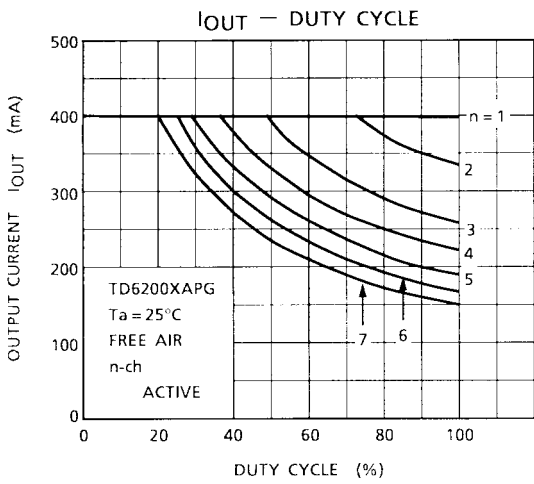
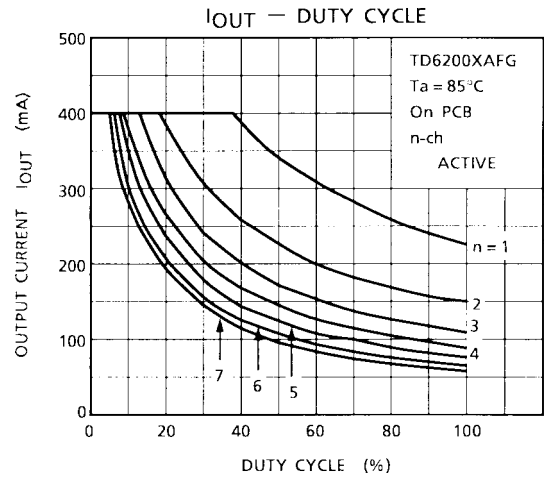
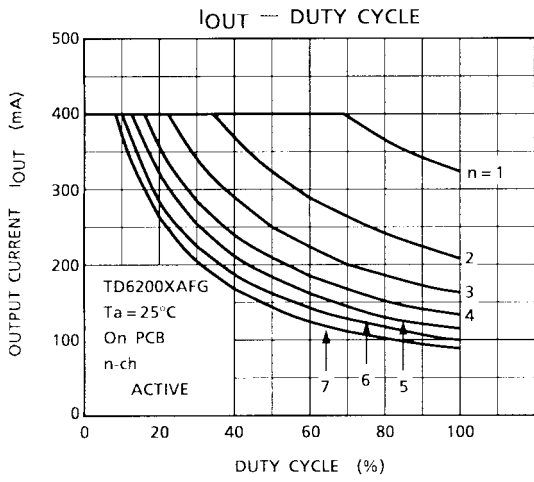
Precautions for Using

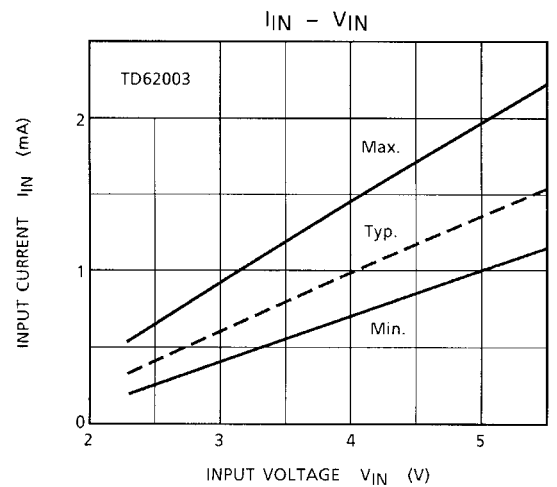
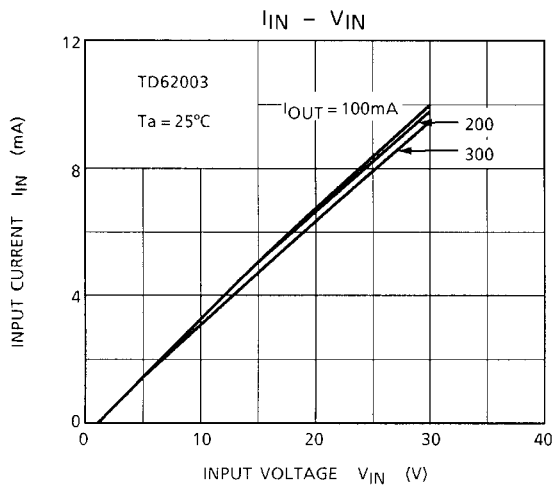
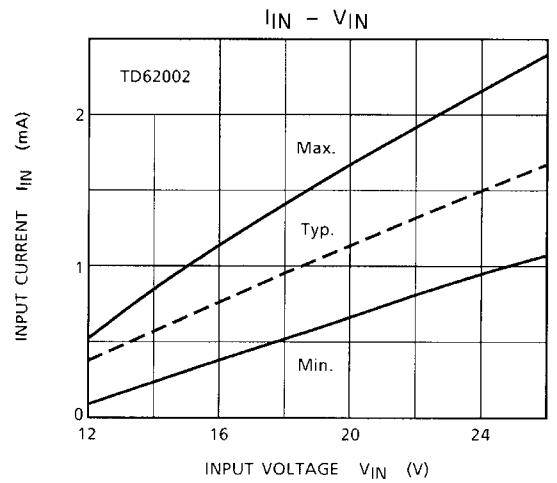
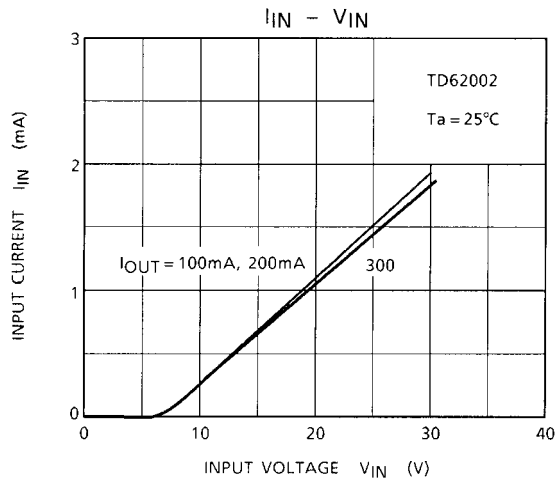
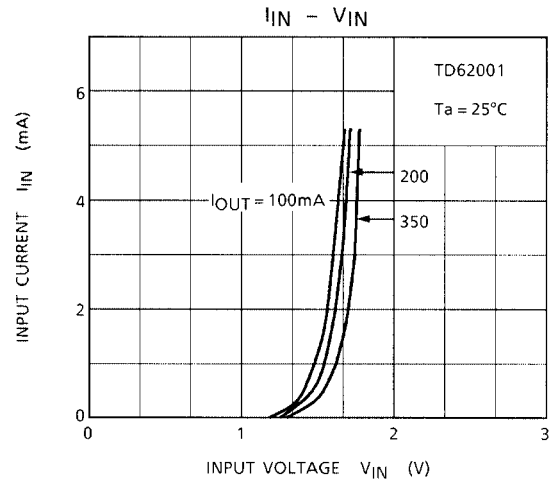
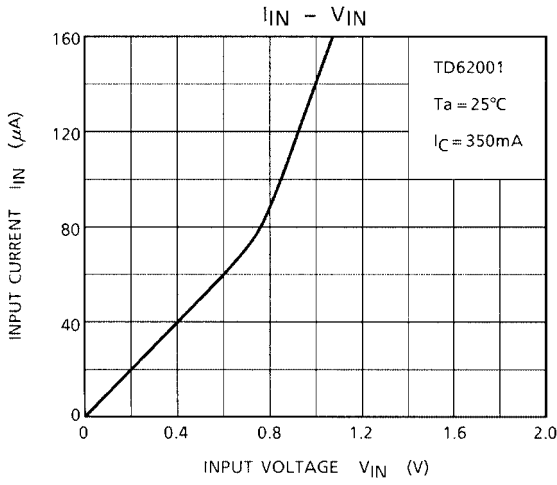
This IC does not include built-in protection circuits for excess current or overvoltage.

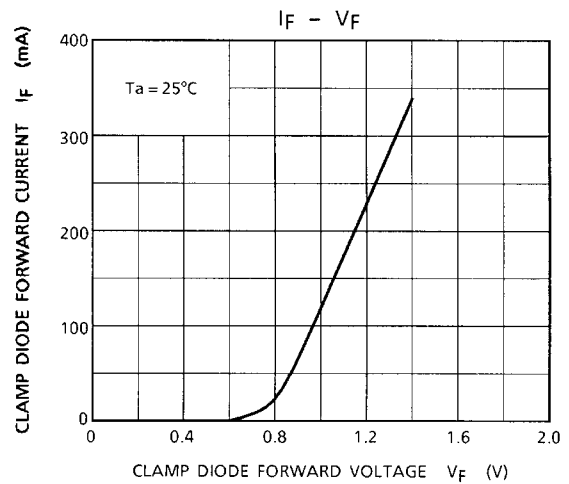
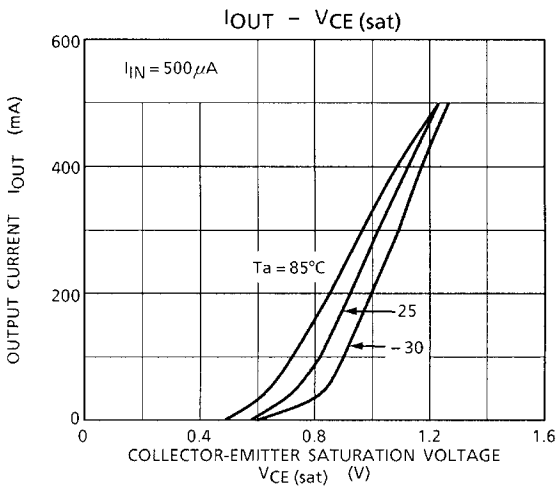
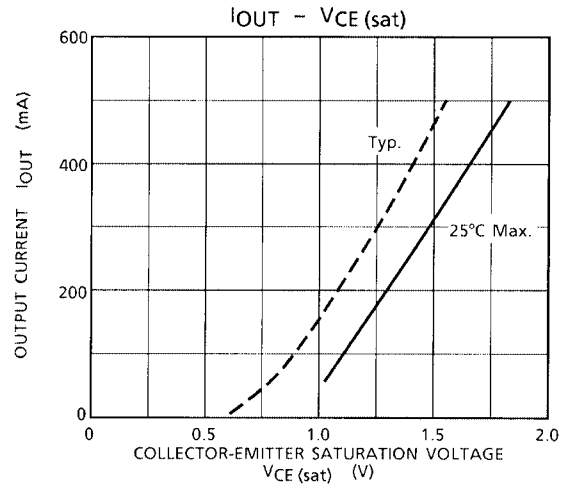
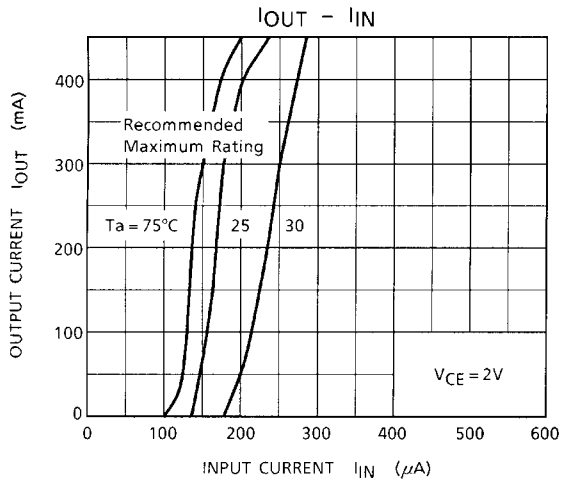
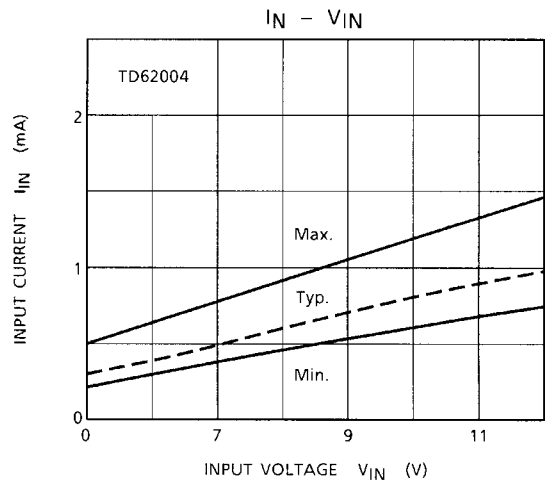
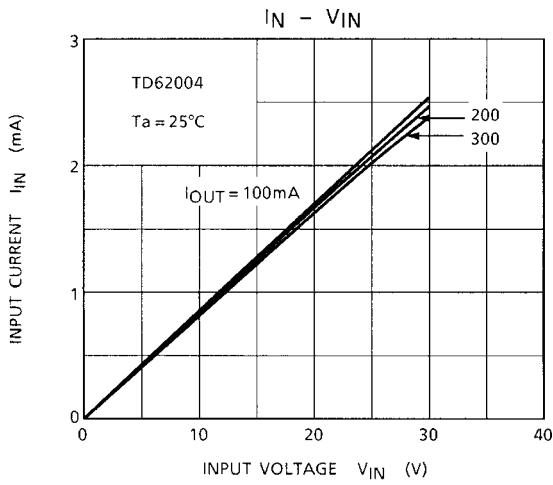
If this IC is subjected to excess current or overvoltage, it may be destroyed.

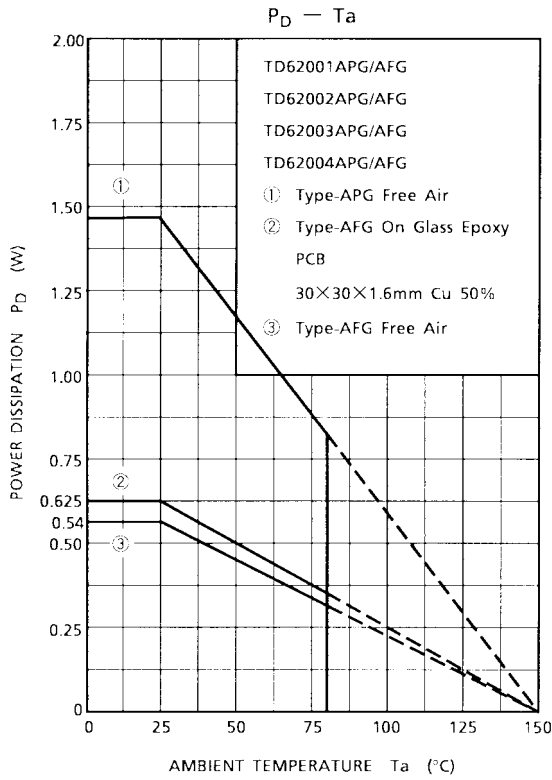
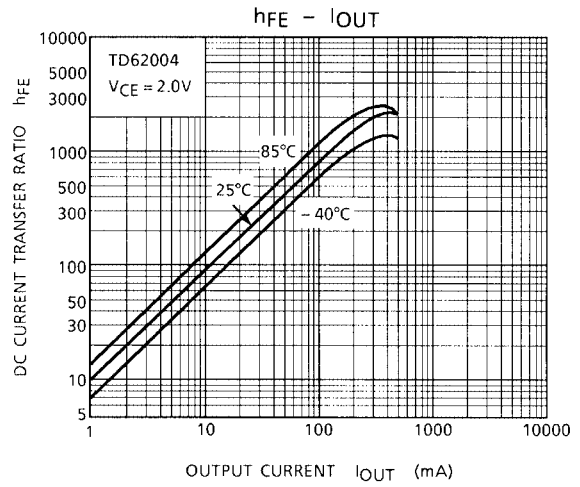
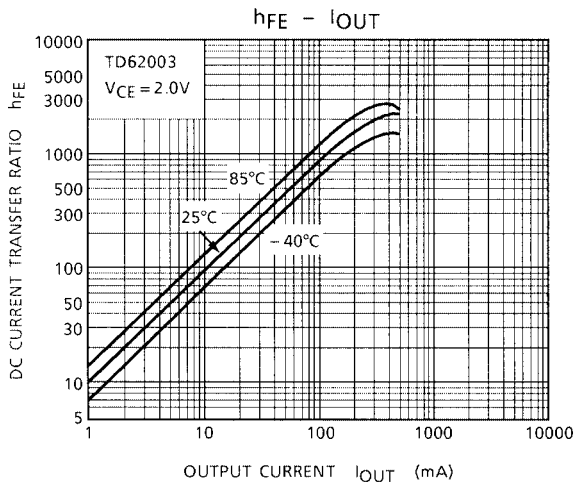
Hence, the utmost care must be taken when systems which incorporate this IC are designed.

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.





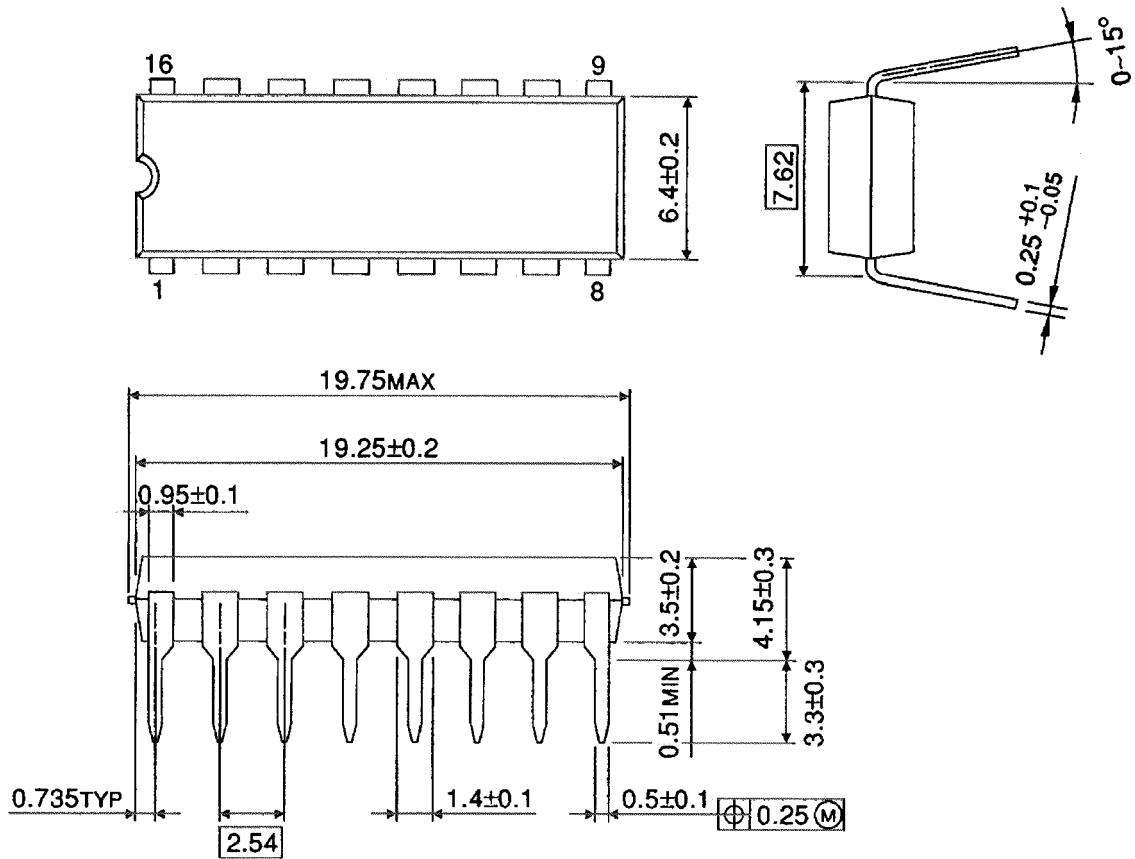




Package Dimensions

DIP16-P-300-2.54A

Unit : mm

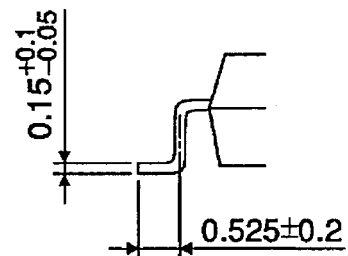
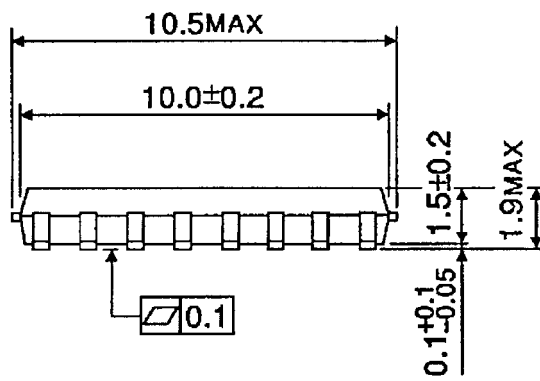
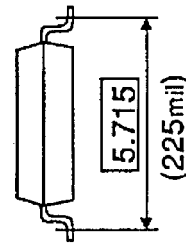
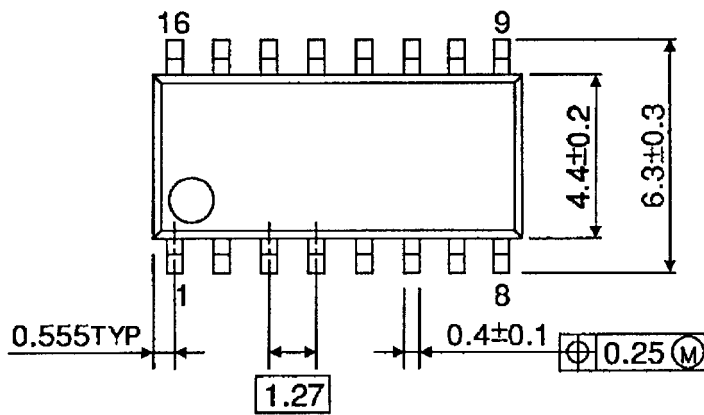


Weight: 1.11 g (Typ.)

Package Dimensions

SOP16-P-225-1.27

Unit : mm



Weight: 0.16 g (Typ.)

RESTRICTIONS ON PRODUCT USE

000707EBA

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