

TOSHIBA BIPOLAR DIGITAL INTEGRATED CIRCUIT SILICON MONOLITHIC

# TD62008AP, TD62008F, TD62008AF

## 7CH DARLINGTON SINK DRIVER

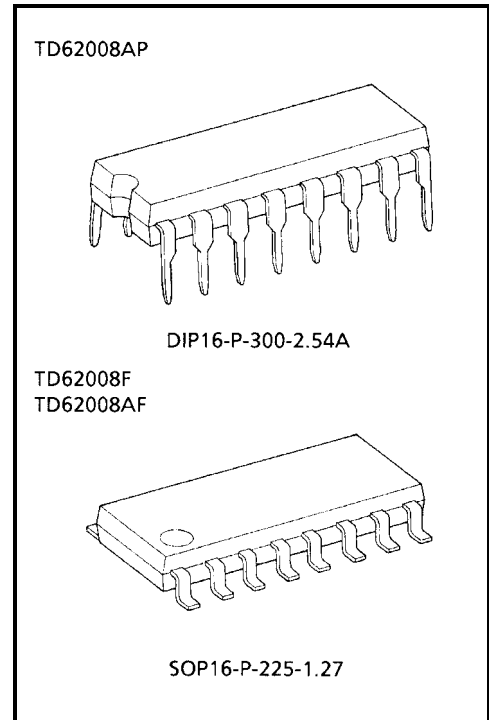
The TD62008AP / F / AF are high-voltage, high-current darlington drivers comprised of seven NPN darlington pairs. All units feature integral clamp diodes for switching inductive loads and protective diodes against a negative input voltage. The TD62008AP / F / AF are suitable for interfaces from minus and plus dual supply voltage system to plus single supply voltage system.

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

Please observe the thermal condition for using.

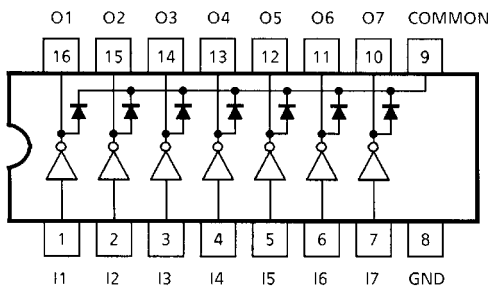
### FEATURES

- Output current (single output) 400 mA (Max)
- High sustaining voltage output 50 V (Min)
- Output clamp diodes
- Protective diodes against a negative input voltage
- Inputs base resistor  $R_{IN} = 20\text{ k}\Omega$
- Inputs compatible with 9~15 V PMOS, CMOS.
- Package type-AP : DIP-16 pin
- Package type-F, AF: SOP-16 pin

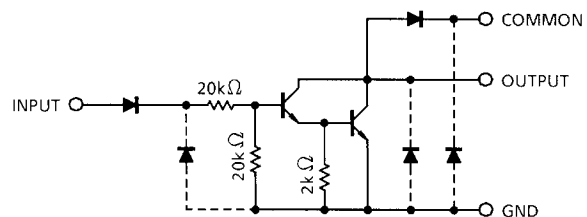


Weight  
 DIP16-P-300-2.54A : 1.11 g (Typ.)  
 SOP16-P-225-1.27 : 0.16 g (Typ.)

### PIN CONNECTION (TOP VIEW)



### SCHEMATICS (EACH DRIVER)



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	AP / AF	V <sub>CE (SUS)</sub>	-0.5 ~ 50	V
	F		-0.5 ~ 35	
Output Current		I <sub>OUT</sub>	400	mA / ch
Input Voltage		V <sub>IN</sub>	-40 ~ 40	V
Clamp Diode Reverse Voltage	AP / AF	V <sub>R</sub>	50	V
	F		35	
Clamp Diode Forward Current		I <sub>F</sub>	400	mA
Power Dissipation	AP	P <sub>D</sub>	1.47	W
	F / AF		0.625 (Note)	
Operating Temperature		T <sub>opr</sub>	-40 ~ 85	°C
Storage Temperature		T <sub>stg</sub>	-55 ~ 150	°C

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

## RECOMMENDED OPERATING CONDITIONS (Ta = -40 ~ 85°C)

CHARACTERISTIC		SYMBOL	CONDITION	MIN	TYP.	MAX	UNIT
Output Sustaining Voltage	AP / AF	V <sub>CE (SUS)</sub>		0	—	50	V
	F			0	—	35	
Output Current	I <sub>OUT</sub>		DC 1 Circuit, T <sub>pw</sub> = 25%, Duty = 40%	0	—	400	mA
			T <sub>pw</sub> = 25 ms, Duty = 10%, 7 Circuits	0	—	200	
Input Voltage		V <sub>IN</sub>		-35	—	35	V
Clamp Diode Reverse Voltage	AP / AF	V <sub>R</sub>		—	—	50	V
	F			—	—	35	
Clamp Diode Forward Current		I <sub>F</sub>		—	—	400	mA
Power Dissipation	AP	P <sub>D</sub>		—	—	0.52	W
	F / AF		Ta = 85°C (Note)	—	—	0.325	

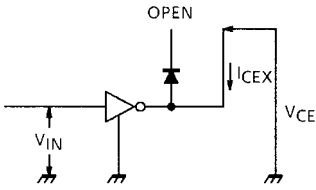
Note: On Glass Epoxy PCB (30 × 30 × 1.6 mm Cu 50%)

## ELECTRICAL CHARACTERISTICS (Ta = 25°C)

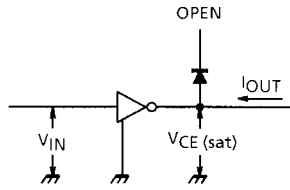
CHARACTERISTIC		SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN	TYP.	MAX	UNIT	
Output Leakage Current	AP / AF	$I_{CEX}$	1	$V_{OUT} = 50\text{ V}$	—	—	100	$\mu\text{A}$	
	F			$V_{OUT} = 35\text{ V}$	—	—	100		
Collector-Emitter Saturation Voltage		$V_{CE(sat)}$	2	$I_{OUT} = 400\text{ mA}$	—	1.3	2.4	V	
				$I_{OUT} = 200\text{ mA}$	—	1.0	1.6		
Input Current	"H" Level	$I_{IN(ON)}$	4	$V_{IN} = 18\text{ V}$	—	0.85	1.8	mA	
				$V_{IN} = 35\text{ V}$	—	—	3.8		
	"L" Level	$I_{IN(OFF)}$	4	$V_{IN} = -35\text{ V}$	—	—	-20	$\mu\text{A}$	
DC Current Transfer Ratio		$h_{FE}$	3	$V_{CE} = 4\text{ V}, I_{OUT} = 350\text{ mA}$	1000	3000	—		
Clamp Diode Reverse Current		$I_R$	5	$V_R = 50\text{ V}, V_R = 35\text{ V (Type-F)}$	—	—	100	$\mu\text{A}$	
Clamp Diode Forward Voltage		$V_F$	6	$I_F = 400\text{ mA}$	—	1.5	2.4	V	
Turn-On Delay	AP / AF	$t_{ON}$	7	$C_L = 15\text{ pF}$	$V_{OUT} = 50\text{ V}, R_L = 156\ \Omega$	—	0.1	—	$\mu\text{s}$
	F				$V_{OUT} = 35\text{ V}, R_L = 110\ \Omega$				
Turn-Off Delay	AP / AF	$t_{OFF}$	7	$C_L = 15\text{ pF}$	$V_{OUT} = 50\text{ V}, R_L = 156\ \Omega$	—	0.2	—	$\mu\text{s}$
	F				$V_{OUT} = 35\text{ V}, R_L = 110\ \Omega$				

**TEST CIRCUIT**

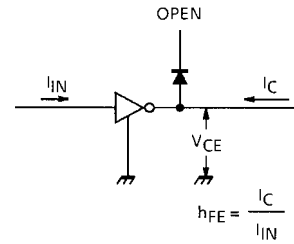
**1.  $I_{CEX}$**



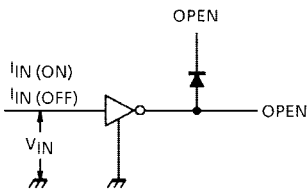
**2.  $V_{CE(sat)}$**



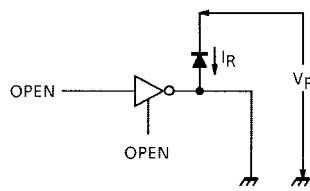
**3.  $h_{FE}$**



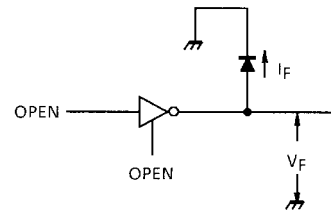
**4.  $I_{IN(ON)}, I_{IN(OFF)}$**



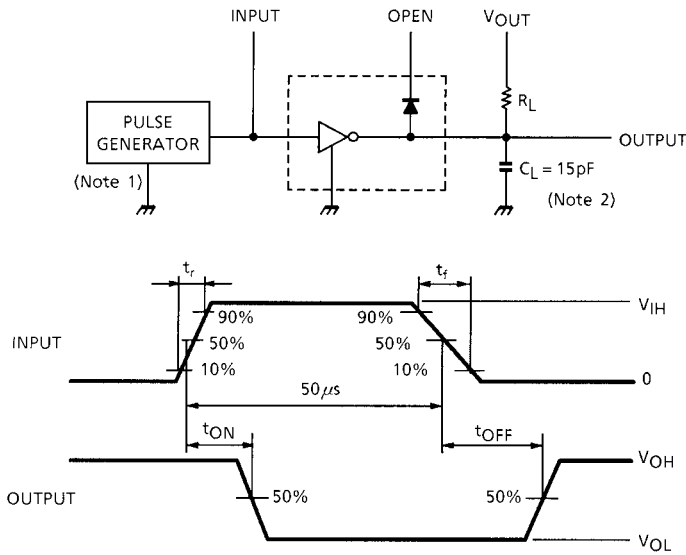
**5.  $I_R$**



**6.  $V_F$**



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



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:  $C_L$  includes probe and jig capacitance

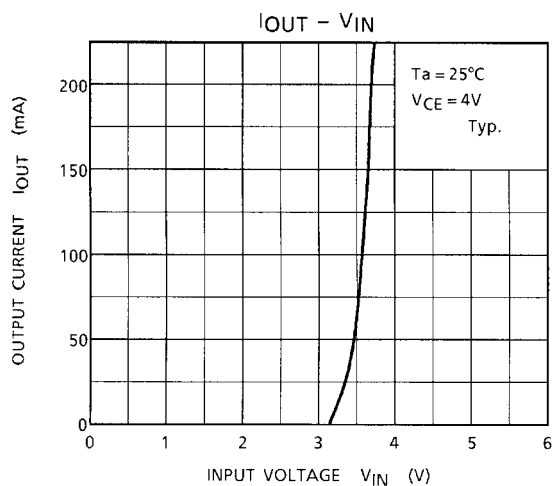
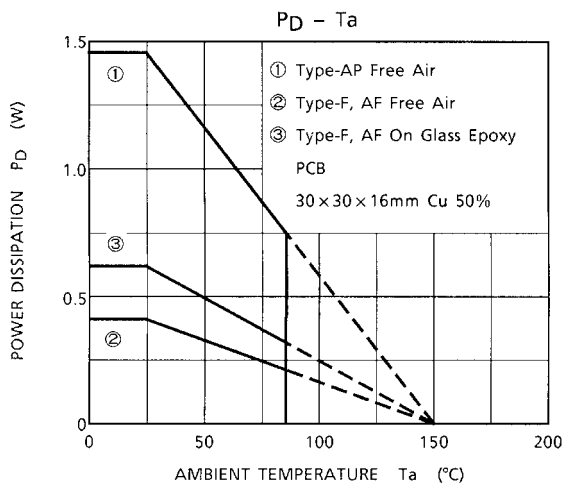
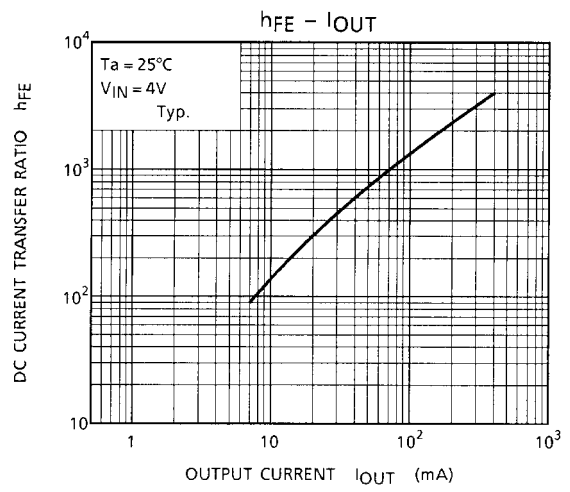
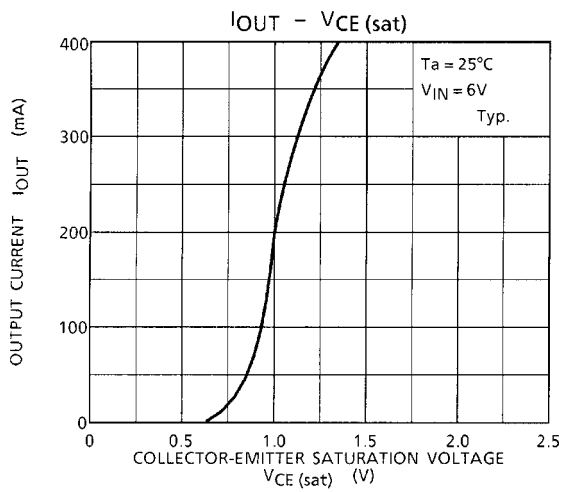
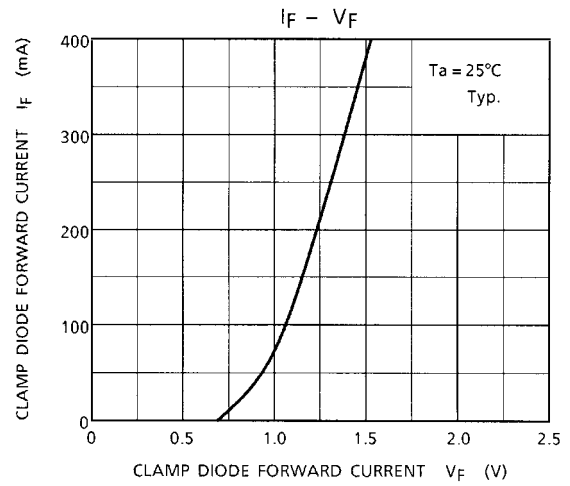
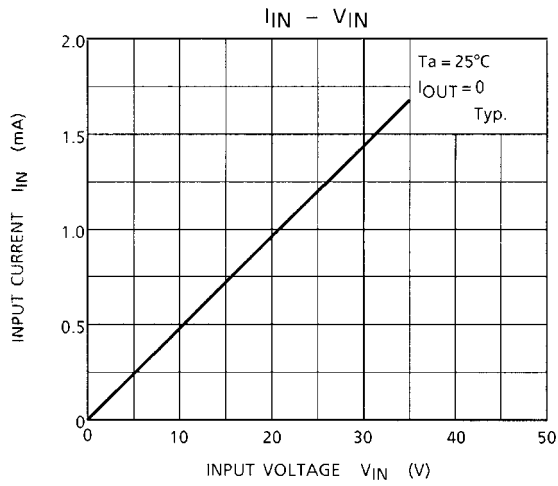
**PRECAUTIONS for USING**

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.

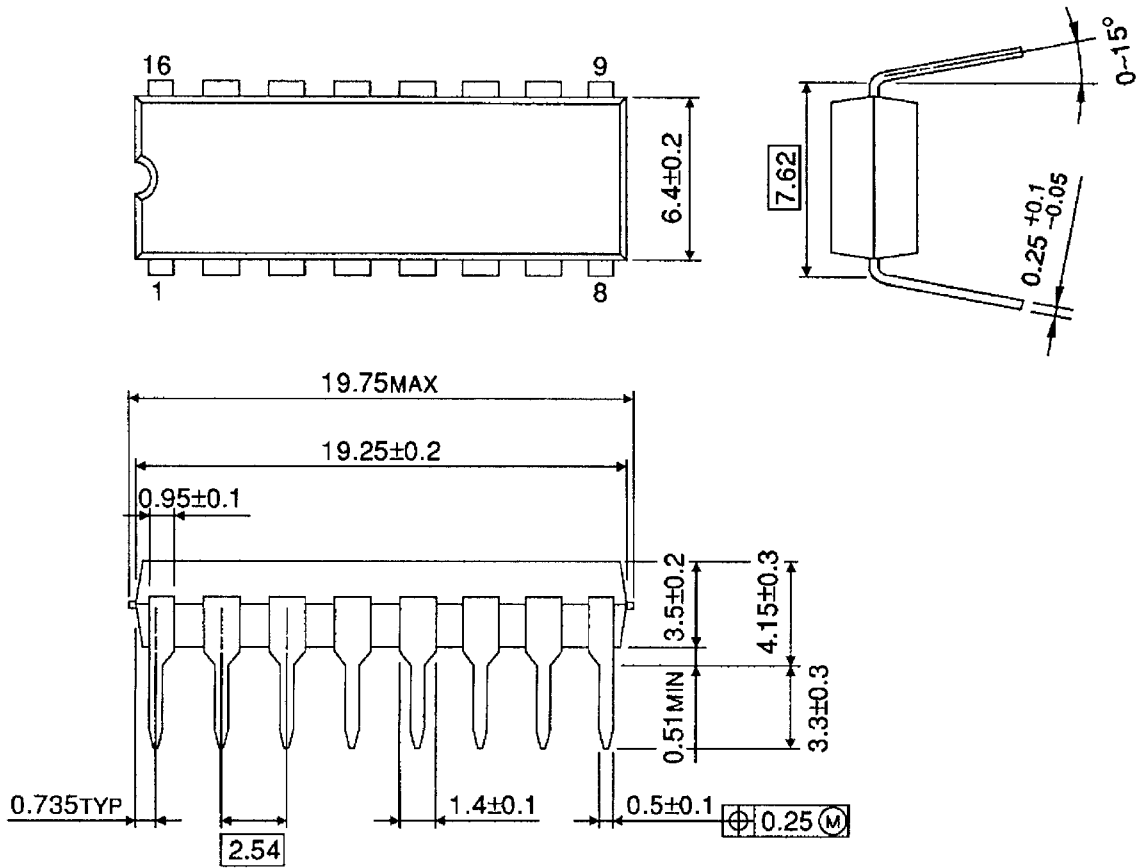
Utmost care is necessary in the design of the output line, COMMON and GND line since IC may be destroyed due to short-circuit between outputs, air contamination fault, or fault by improper grounding.



## PACKAGE DIMENSIONS

DIP16-P-300-2.54A

Unit : mm

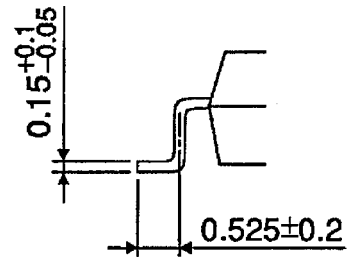
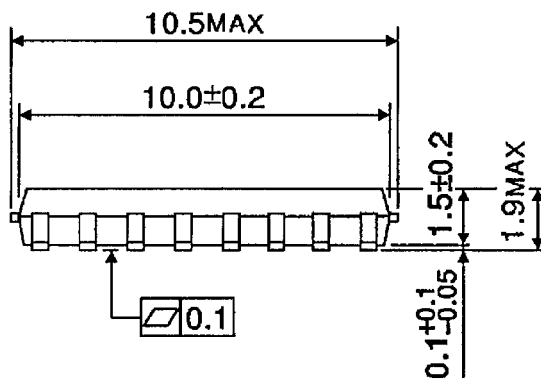
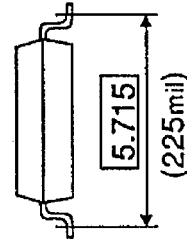
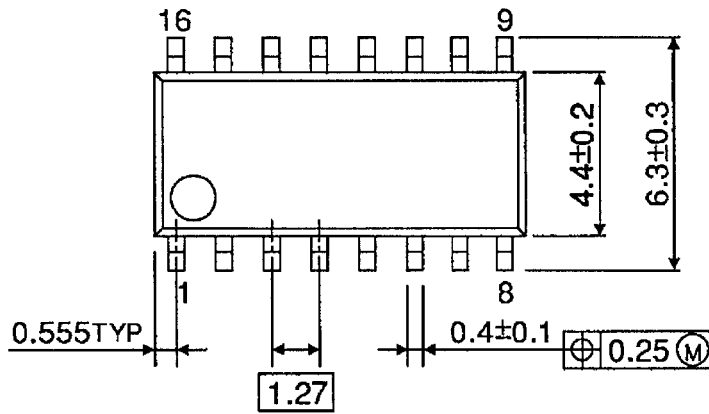


Weight: 1.11 g (Typ.)

## PACKAGE DIMENSIONS

SOP16-P-225-1.27

Unit : mm



Weight: 0.16 g (Typ.)

**RESTRICTIONS ON PRODUCT USE**

000707EBA

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