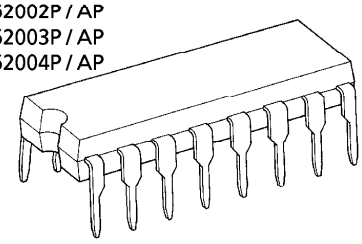
TOSHIBA BIPOLAR DIGITAL INTEGRATED CIRCUIT
TD62001P, TD62001AP, TD62001F, TD62001AF
TD62002P, TD62002AP, TD62002F, TD62002AF
TD62003P, TD62003AP, TD62003F, TD62003AF
TD62004P, TD62004AP, TD62004F, TD62004AF
SILICON MONOLITHIC

7CH DARLINGTON SINK DRIVER

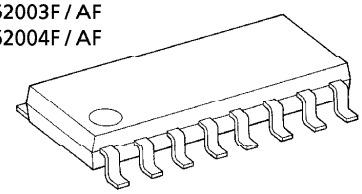
The TD62001P / AP / F / AF Series are high-voltage, high-current darlington drivers comprised of seven NPN darlington pairs.
All units feature integral clamp diodes for switching inductive loads.
Applications include relay, hammer, lamp and display (LED) drivers.

TD62001P / AP
TD62002P / AP
TD62003P / AP
TD62004P / AP



DIP16-P-300A

TD62001F / AF
TD62002F / AF
TD62003F / AF
TD62004F / AF



SOP16-P-225

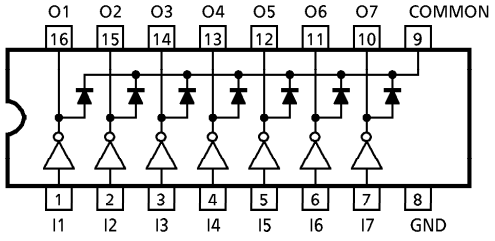
Weight DIP16-P-300A : 1.11g (Typ.)
SOP16-P-225 : 0.16g (Typ.)

FEATURES

- Output current (single output) 500mA MAX.
- High sustaining voltage output
  35V MIN. (TD62001P / F Series)
  50V MIN. (TD62001AP / AF Series)
- Output clamp diodes
- Inputs compatible with various types of logic
- Package Type-P, AP : DIP-16pin
- Package Type-F, AF : SOP-16pin

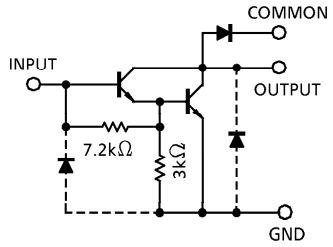
TYPE	INPUT BASE RESISTOR	DESIGNATION
TD62001P / AP / F / AF	External	General Purpose
TD62002P / AP / F / AF	10.5-kΩ + 7V Zenner diode	14~25V PMOS
TD62003P / AP / F / AF	2.7kΩ	TTL, 5V CMOS
TD62004P / AP / F / AF	10.5kΩ	6~15V PMOS, CMOS

PIN CONNECTION (TOP VIEW)

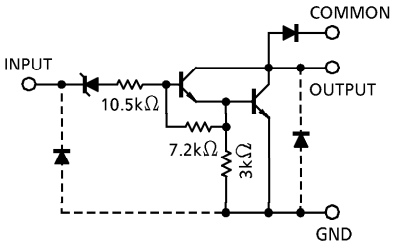


SCHEMATICS (EACH DRIVER)

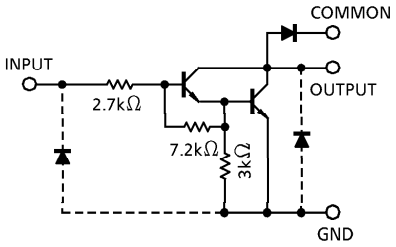
TD62001P / AP / F / AF



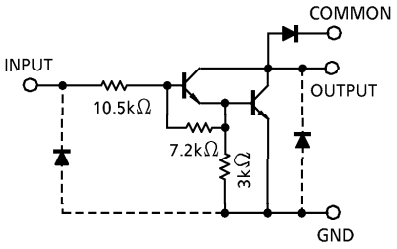
TD62002P / AP / F / AF



TD62003P / AP / F / AF



TD62004P / AP / F / AF



(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	P, F	$V_{CE\ (SUS)}$	−0.5~35	V
	AP, AF		−0.5~50	
Output Current		I_{OUT}	500	mA / ch
Input Voltage		V_{IN} (Note 1)	−0.5~30	V
Input Current		I_{IN} (Note 2)	25	mA
Clamp Diode Reverse Voltage	P, F	V_R	35	V
	AP, AF		50	
Clamp Diode Forward Current		I_F	500	mA
Power Dissipation	P	P_D	1.0	W
	AP		1.47	
	F, AF		0.54 / 0.69 (Note 3)	
Operating Temperature	P	T_{opr}	−30~75	°C
	AP, F, AF		−40~85	
Storage Temperature		T_{stg}	−55~150	°C

(Note 1) Except TD62001P / AP / F / AF
(Note 2) Only TD62001P / AP / F / AF
(Note 3) On glass epoxy PCB (30 × 30 × 1.6mm Cu 50%)

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

CHARACTERISTIC		SYMBOL	CONDITION		MIN.	TYP.	MAX.	UNIT
Output Sustaining Voltage	P, F	$V_{CE\ (SUS)}$			0	—	35	V
	AP, AF				0	—	50	
Output Current	AP	I_{OUT}	T_{pw} = 25ms, 7 Circuits, Ta = 85°C, T_j = 120°C	Duty = 10%	0	—	370	mA / ch
				Duty = 50%	0	—	130	
	P			Duty = 10%	0	—	295	
				Duty = 50%	0	—	95	
	F, AF			Duty = 10%	0	—	233	
				Duty = 50%	0	—	70	
Input Voltage	Except TD62001P / AP / F / AF	V_{IN}			0	—	24	V
Input Voltage (Output On)	TD62002	$V_{IN\ (ON)}$	I_{OUT} = 400mA, 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	P, F	V_R			—	—	35	V
	AP, AF				—	—	50	
Clamp Diode Forward Current		I_F			—	—	350	mA
Power Dissipation	P	P_D	Ta = 85°C		—	—	0.6	W
	AP				—	—	0.76	
	AF, F		(Note) Ta = 85°C		—	—	0.36	

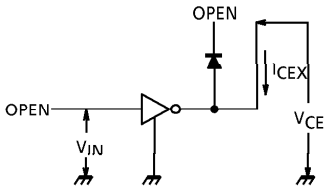
(Note) On glass epoxy PCB (30 × 30 × 1.6mm Cu 50%)

ELECTRICAL CHARACTERISTICS (Ta = 25°C unless otherwise noted)

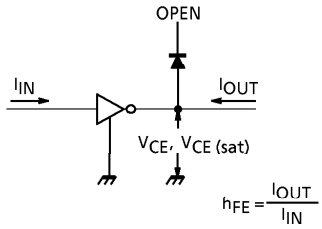
CHARACTERISTIC		SYMBOL	TEST CIR-CUIT	TEST CONDITION		MIN.	TYP.	MAX.	UNIT
Output Leakage Current	AP, AF	I_{CEX}	1	V_{CE} = 50V, Ta = 25°C		—	—	50	μA
				V_{CE} = 50V, Ta = 85°C		—	—	100	
	F			V_{CE} = 35V, Ta = 25°C		—	—	50	
				V_{CE} = 35V, Ta = 85°C		—	—	100	
	P			V_{CE} = 35V, Ta = 25°C		—	—	50	
				V_{CE} = 35V, Ta = 75°C		—	—	100	
Collector-Emitter Saturation Voltage		$V_{CE\ (sat)}$	2	I_{OUT} = 350mA, I_{IN} = 500μA		—	1.3	1.6	V
				I_{OUT} = 200mA, I_{IN} = 350μA		—	1.1	1.3	
				I_{OUT} = 100mA, I_{IN} = 250μA		—	0.9	1.1	
DC Current Transfer Ratio		h_{FE}	2	V_{CE} = 2V, I_{OUT} = 350mA		1000	—	—	
Input Current (Output On)	TD62002	$I_{IN\ (ON)}$	3	V_{IN} = 20V, I_{OUT} = 350mA		—	1.1	1.7	mA
	TD62003			V_{IN} = 2.4V, I_{OUT} = 350mA		—	0.4	0.7	
	TD62004			V_{IN} = 9.5V, I_{OUT} = 350mA		—	0.8	1.2	
Input Current (Output Off)	P	$I_{IN\ (OFF)}$	4	I_{OUT} = 500μA, Ta = 75°C		50	65	—	μA
	AP, F, AF			I_{OUT} = 500μA, Ta = 85°C		50	65	—	
Input Voltage (Output On)	TD62002	$V_{IN\ (ON)}$	5	V_{CE} = 2V, h_{FE} = 800	I_{OUT} = 350mA	—	—	13.7	V
					I_{OUT} = 200mA	—	—	11.4	
	TD62003				I_{OUT} = 350mA	—	—	2.6	
					I_{OUT} = 200mA	—	—	2.0	
	TD62004				I_{OUT} = 350mA	—	—	4.7	
					I_{OUT} = 200mA	—	—	4.4	
Clamp Diode Reverse Current	AP, AF	I_R	6	V_R = 50V, Ta = 25°C		—	—	50	μA
				V_R = 50V, Ta = 85°C		—	—	100	
	F			V_R = 35V, Ta = 25°C		—	—	50	
				V_R = 35V, Ta = 85°C		—	—	100	
	P			V_R = 35V, Ta = 25°C		—	—	50	
				V_R = 35V, Ta = 75°C		—	—	100	
Clamp Diode Forward Voltage		V_F	7	I_F = 350mA		—	—	2.0	V
Input Capacitance		C_{IN}	—			—	15	—	pF
Turn-On Delay	P, F	t_{ON}	8	V_{OUT} = 35V, R_L = 87.5Ω, C_L = 15pF		—	0.1	—	μs
	AP, AF			V_{OUT} = 50V, R_L = 125Ω, C_L = 15pF		—	0.1	—	
Turn-Off Delay	P, F	t_{OFF}	8	V_{OUT} = 35V, R_L = 87.5Ω, C_L = 15pF		—	0.2	—	
	AP, AF			V_{OUT} = 50V, R_L = 125Ω, C_L = 15pF		—	0.2	—	

TEST CIRCUIT

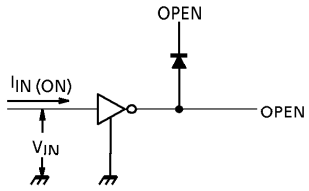
1. I_{CEX}



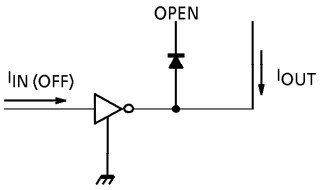
2. $V_{CE\ (sat)}$, h_{FE}



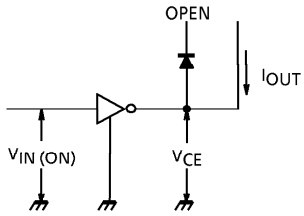
3. $I_{IN\ (ON)}$



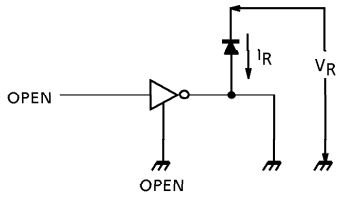
4. $I_{IN\ (OFF)}$



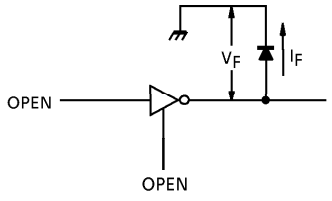
5. $V_{IN\ (ON)}$



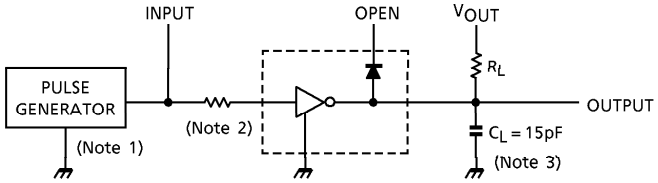
6. I_R

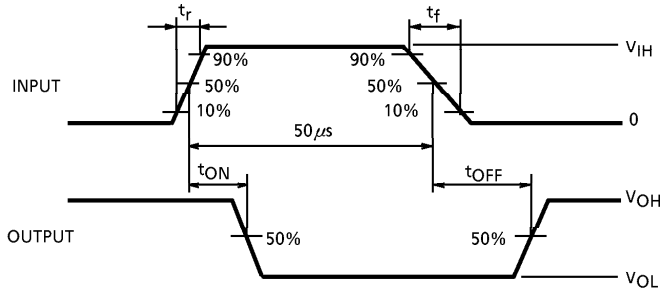


7. V_F



8. t_{ON}, t_{OFF}





(Note 1) Pulse width 50μs, duty cycle 10%
Output impedance 50Ω, $t_r \leqq 5$ns, $t_f \leqq 10$ns

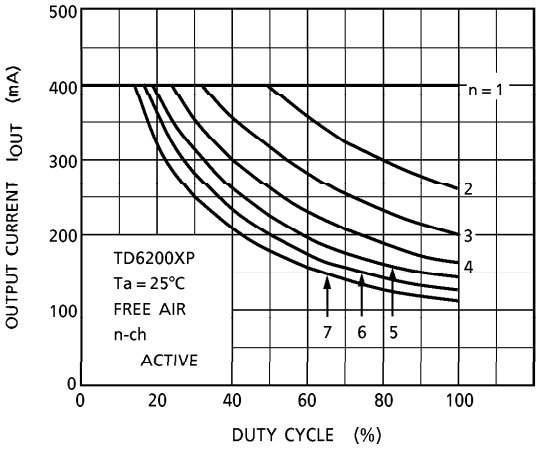
(Note 2) See below

INPUT CONDITION

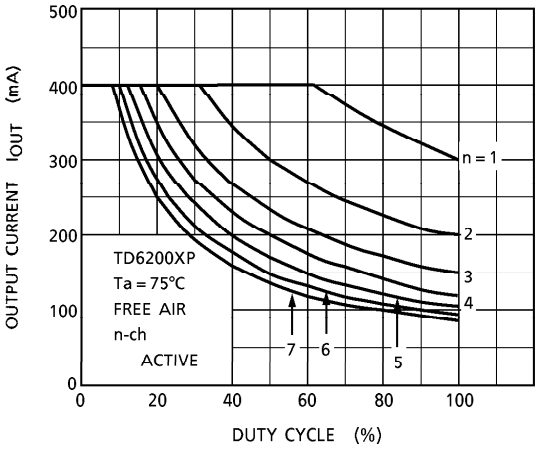
TYPE NUMBER	R1	V_{IH}
TD62001P / AP / F / AF	2.7kΩ	3V
TD62002P / AP / F / AF	0	13V
TD62003P / AP / F / AF	0	3V
TD62004P / AP / F / AF	0	8V

(Note 3) C_L includes probe and jig capacitance.

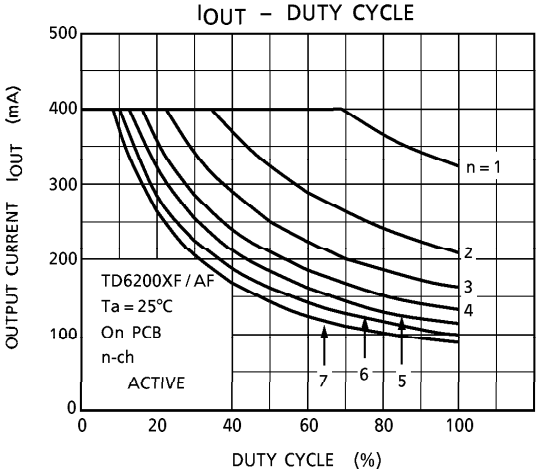
I_{OUT} – DUTY CYCLE



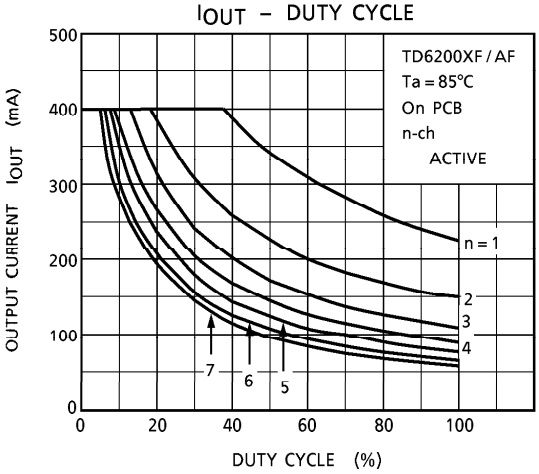
I_{OUT} – DUTY CYCLE



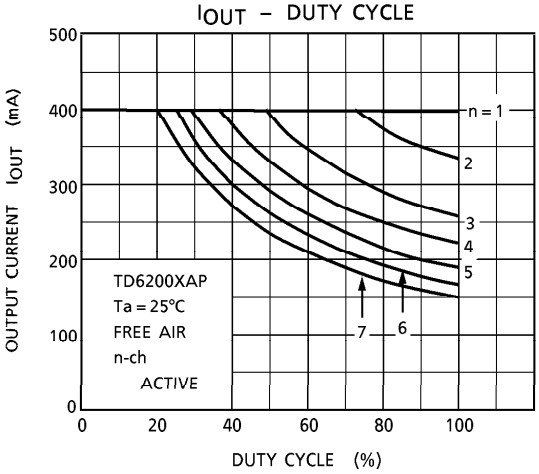
I_{OUT} – DUTY CYCLE



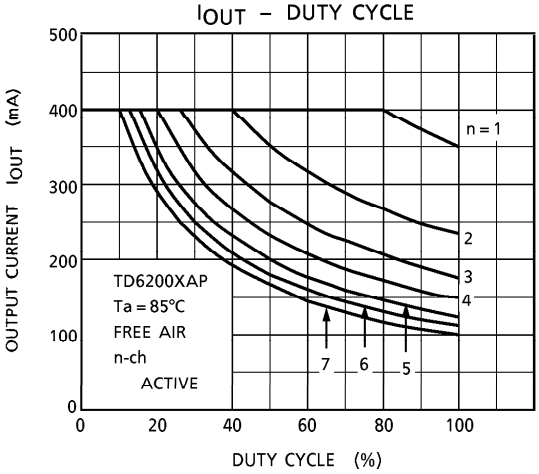
I_{OUT} – DUTY CYCLE



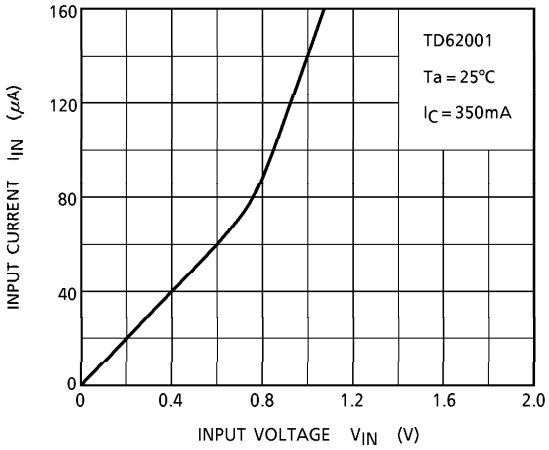
I_{OUT} – DUTY CYCLE



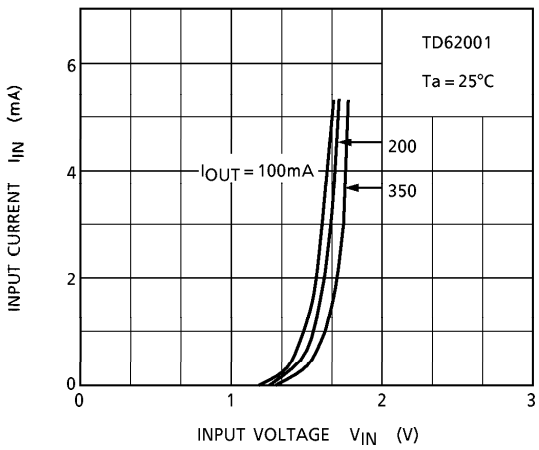
I_{OUT} – DUTY CYCLE



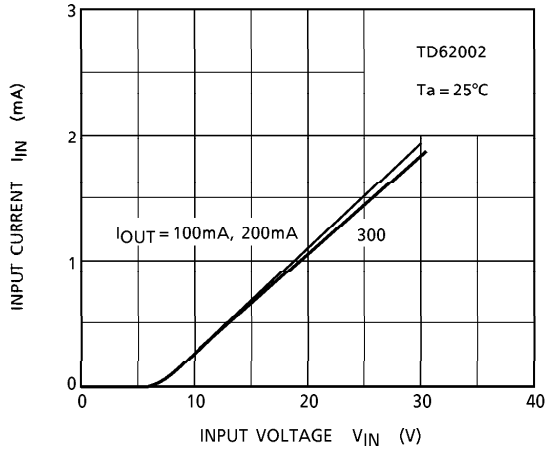
I_{IN} – V_{IN}



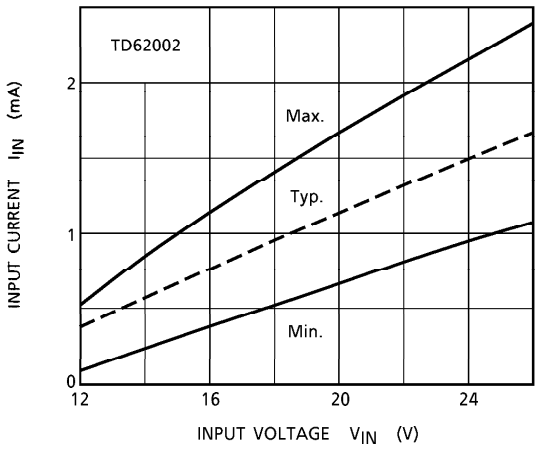
I_{IN} – V_{IN}



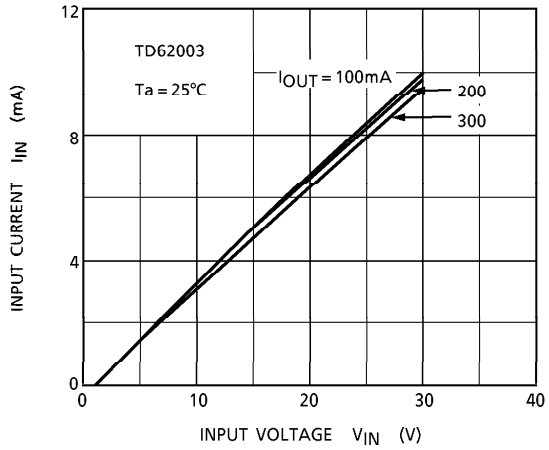
I_{IN} – V_{IN}



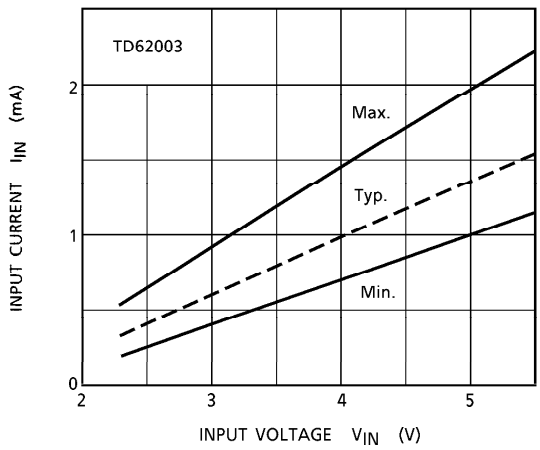
I_{IN} – V_{IN}



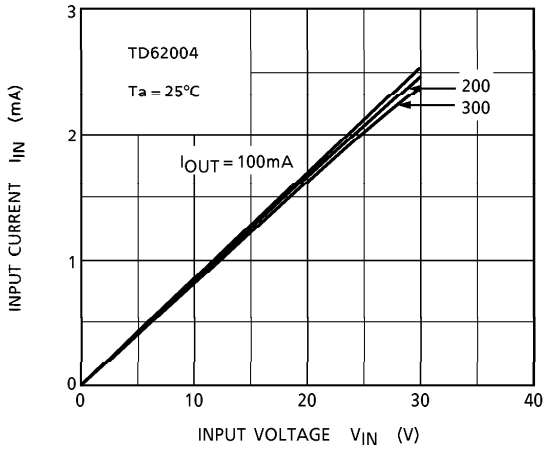
I_{IN} – V_{IN}



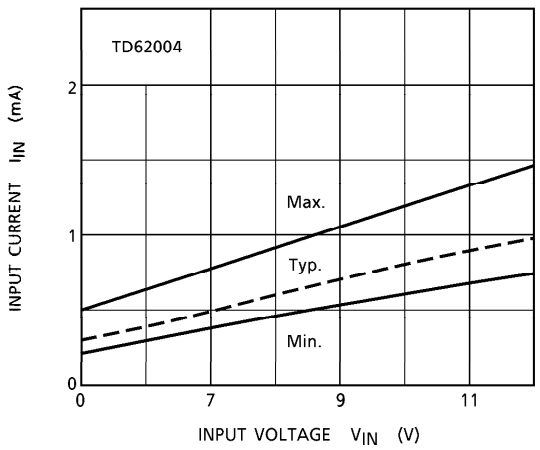
I_{IN} – V_{IN}



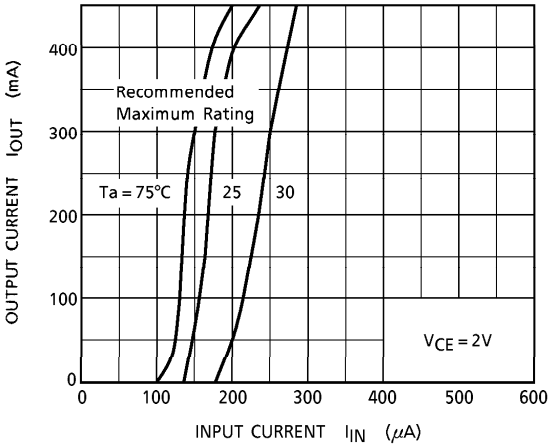
$I_N - V_{IN}$



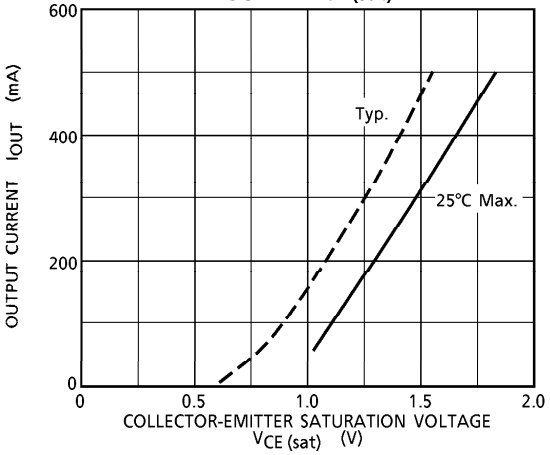
$I_N - V_{IN}$



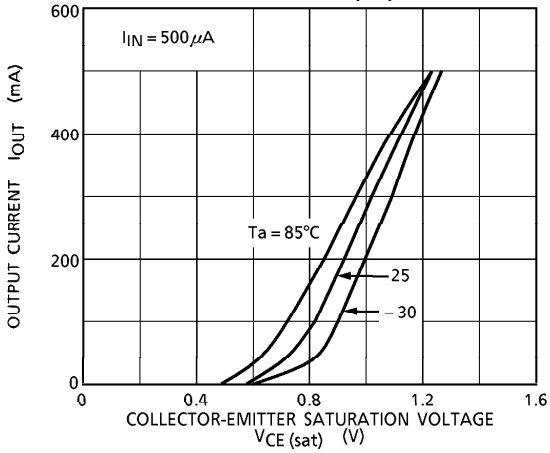
$I_{OUT} - I_{IN}$



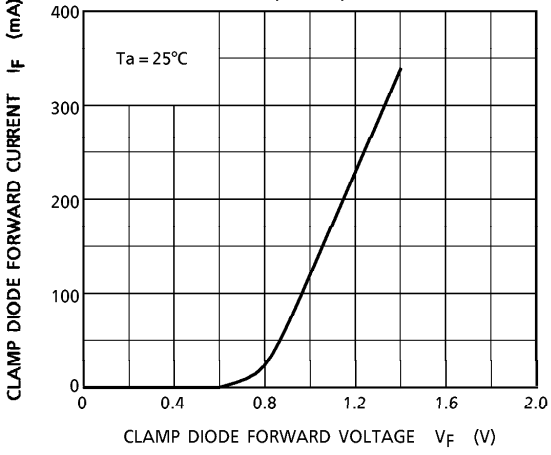
$I_{OUT} - V_{CE\,(sat)}$



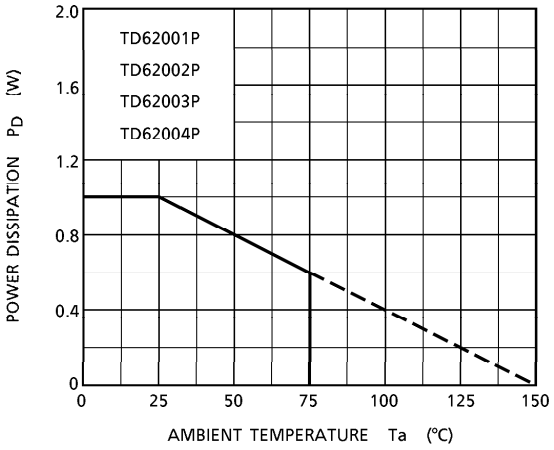
$I_{OUT} - V_{CE\,(sat)}$



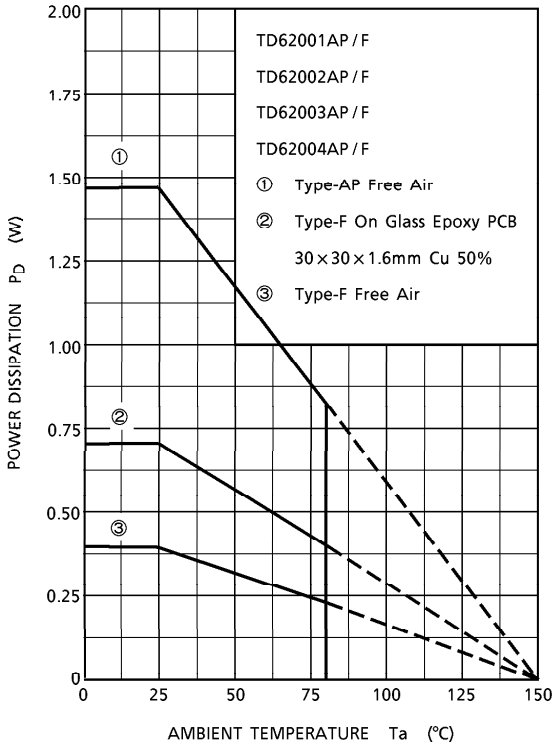
$I_F - V_F$



P_D – Ta


TD62001P
TD62002P
TD62003P
TD62004P
POWER DISSIPATION P_D (W)
2.0
1.6
1.2
0.8
0.4
0
0
25
50
75
100
125
150
AMBIENT TEMPERATURE Ta (°C)

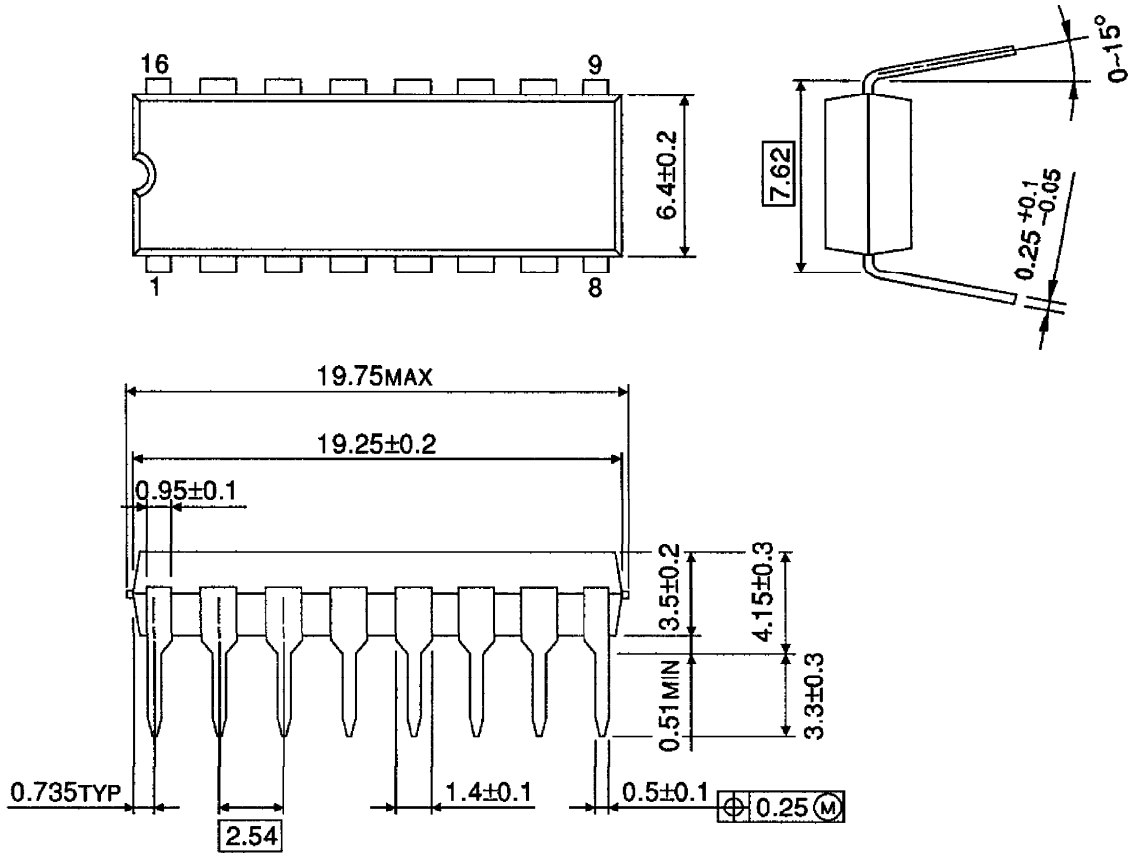
P_D – Ta


TD62001AP / F
TD62002AP / F
TD62003AP / F
TD62004AP / F
① Type-AP Free Air
② Type-F On Glass Epoxy PCB
30×30×1.6mm Cu 50%
③ Type-F Free Air
POWER DISSIPATION P_D (W)
2.00
1.75
1.50
1.25
1.00
0.75
0.50
0.25
0
0
25
50
75
100
125
150
AMBIENT TEMPERATURE Ta (°C)

OUTLINE DRAWING

DIP16-P-300A

Unit : mm

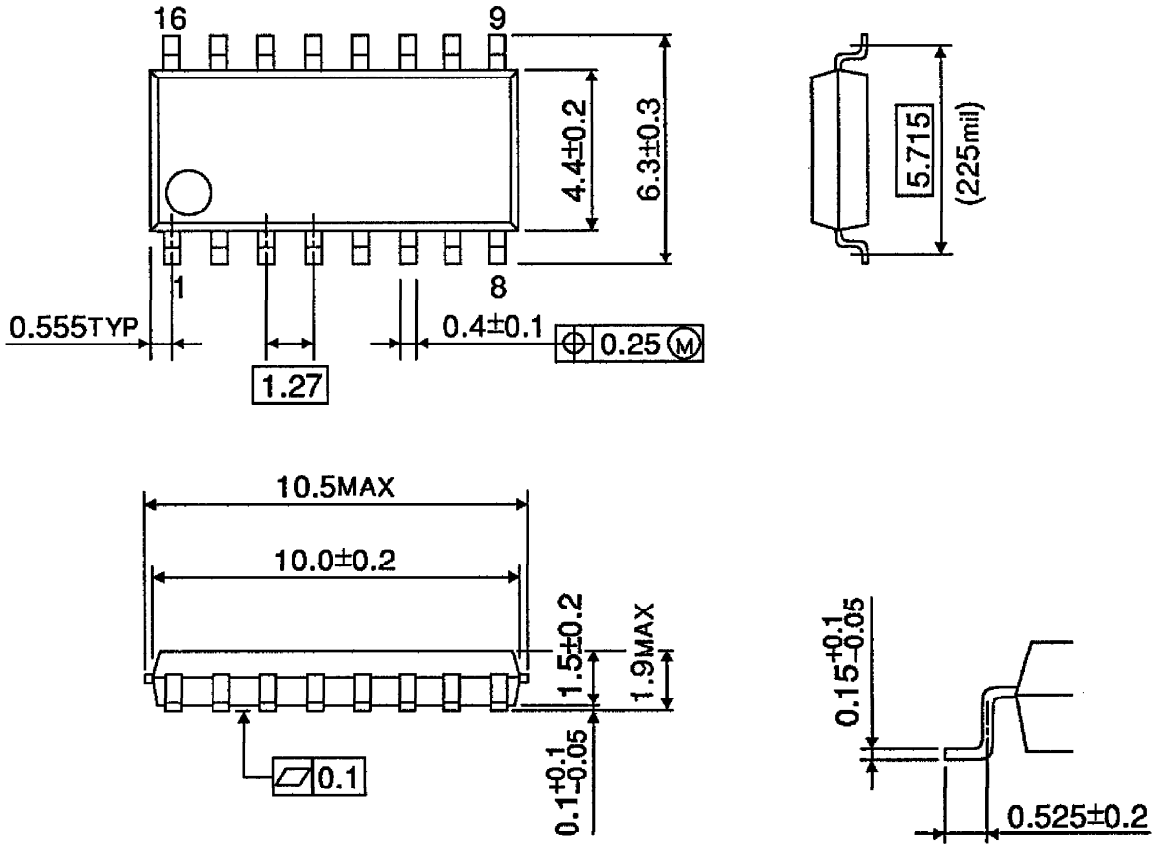


Weight : 1.11g (Typ.)

OUTLINE DRAWING

SOP16-P-225

Unit : mm



Weight : 0.16g (Typ.)