

**TOSHIBA**

**TD62003,004PA/APA**

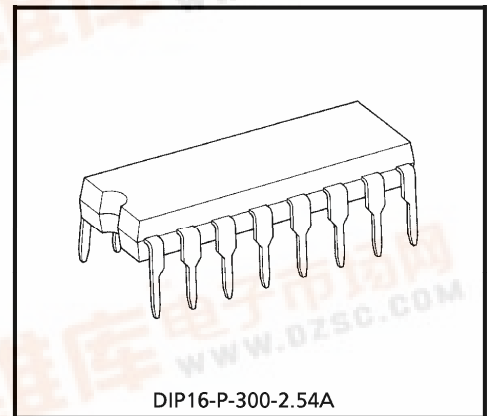
TOSHIBA BIPOLAR DIGITAL INTEGRATED CIRCUIT SILICON MONOLITHIC

**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.



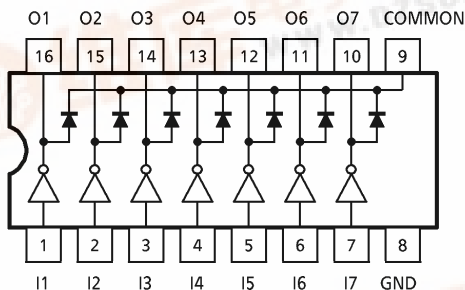
DIP16-P-300-2.54A

Weight : 1.11g (Typ.)

**FEATURES**

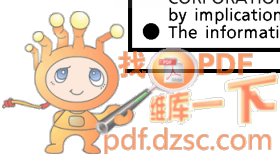
- Output current (single output) 500mA (Max.)
- High sustaining voltage output  
 35V (Min.) (TD62003PA series)  
 50V (Min.) (TD62003APA series)
- Output clamp diodes
- Inputs compatible with various types of logic.  
 TD62003PA, APA  $R_{IN} = 2.7k\Omega$   
 TD62004PA, APA  $R_{IN} = 10.5k\Omega$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

**PIN CONNECTION (TOP VIEW)**



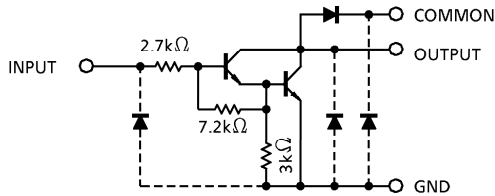
961001EBA2

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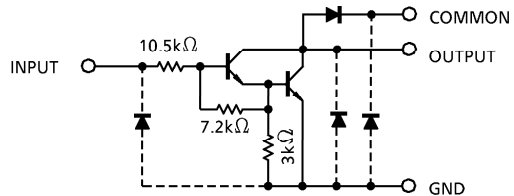


**SCHEMATICS (EACH DRIVER)**

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)

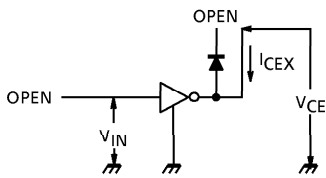
CHARACTERISTIC		SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	
Output Sustaining Voltage	PA	V <sub>CE (SUS)</sub>		0	—	35	V	
	APA			0	—	50		
Output Current	PA	I <sub>OUT</sub>	T <sub>pw</sub> = 25ms 7 Circuits	Duty = 10%	0	—	370	mA / ch
				Duty = 50%	0	—	140	
	APA			Duty = 10%	0	—	400	
				Duty = 50%	0	—	170	
Input Voltage		V <sub>IN</sub>		0	—	24	V	
	TD62003	V <sub>IN (ON)</sub>	I <sub>OUT</sub> = 400mA, h <sub>FE</sub> = 800	2.8	—	24	V	
	TD62004			6.2	—	24		
	TD62003	V <sub>IN (OFF)</sub>		0	—	0.7	V	
TD62004			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)**

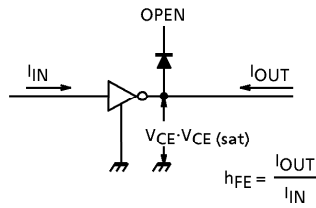
CHARACTERISTIC		SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT	
Output Leakage Current	APA	I <sub>CEX</sub>	1	V <sub>CE</sub> = 50V, Ta = 25°C	—	—	50	μA	
	PA			V <sub>CE</sub> = 50V, Ta = 85°C	—	—	100		
				V <sub>CE</sub> = 35V, Ta = 25°C	—	—	50		
				V <sub>CE</sub> = 35V, Ta = 75°C	—	—	100		
Collector-Emitter Saturation Voltage		V <sub>CE (sat)</sub>	2	I <sub>OUT</sub> = 350mA, I <sub>IN</sub> = 500μA	—	1.3	1.6	V	
				I <sub>OUT</sub> = 200mA, I <sub>IN</sub> = 350μA	—	1.1	1.3		
				I <sub>OUT</sub> = 100mA, I <sub>IN</sub> = 250μA	—	0.9	1.1		
DC Current Transfer Ratio		h <sub>FE</sub>	2	V <sub>CE</sub> = 2V, I <sub>OUT</sub> = 350mA	1000	—	—		
Input Current (Output On)	TD62003	I <sub>IN (ON)</sub>	3	V <sub>IN</sub> = 2.4V, I <sub>OUT</sub> = 350mA	—	0.4	0.7	mA	
	TD62004			V <sub>IN</sub> = 9.5V, I <sub>OUT</sub> = 350mA	—	0.8	1.3		
	PA	I <sub>IN (OFF)</sub>	4	I <sub>OUT</sub> = 500μA, Ta = 75°C	50	65	—	μA	
	APA			I <sub>OUT</sub> = 500μA, Ta = 85°C	50	65	—		
Input Voltage (Output On)	TD62003	V <sub>IN (ON)</sub>	5	V <sub>CE</sub> = 2V h <sub>FE</sub> = 800	I <sub>OUT</sub> = 350mA	—	—	2.6	V
					I <sub>OUT</sub> = 200mA	—	—	2.0	
	TD62004				I <sub>OUT</sub> = 350mA	—	—	4.7	
					I <sub>OUT</sub> = 200mA	—	—	4.4	
Clamp Diode Reverse Current	APA	I <sub>R</sub>	6	V <sub>R</sub> = 50V, Ta = 25°C	—	—	50	μA	
	PA			V <sub>R</sub> = 50V, Ta = 85°C	—	—	100		
				V <sub>R</sub> = 35V, Ta = 25°C	—	—	50		
				V <sub>R</sub> = 35V, Ta = 75°C	—	—	100		
Clamp Diode Forward Voltage		V <sub>F</sub>	7	I <sub>F</sub> = 350mA	—	—	2.0	V	
Input Capacitance		C <sub>IN</sub>	—		—	15	—	pF	
Turn-on Delay	PA	t <sub>ON</sub>	8	V <sub>OUT</sub> = 35V, R <sub>L</sub> = 85Ω C <sub>L</sub> = 15pF	—	0.1	—	μs	
	APA			V <sub>OUT</sub> = 50V, R <sub>L</sub> = 125Ω C <sub>L</sub> = 15pF	—	0.1	—		
Turn-Off Delay	PA	t <sub>OFF</sub>	8	V <sub>OUT</sub> = 35V, R <sub>L</sub> = 85Ω C <sub>L</sub> = 15pF	—	0.2	—		
	APA			V <sub>OUT</sub> = 50V, R <sub>L</sub> = 125Ω C <sub>L</sub> = 15pF	—	0.2	—		

**TEST CIRCUIT**

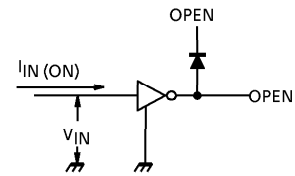
1.  $I_{CEX}$



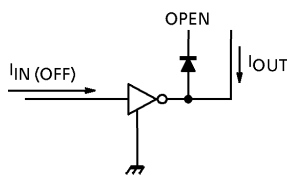
2.  $V_{CE(sat)}$ ,  $h_{FE}$



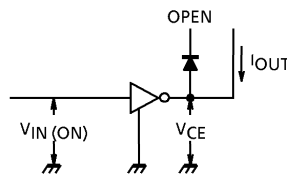
3.  $I_{IN(ON)}$



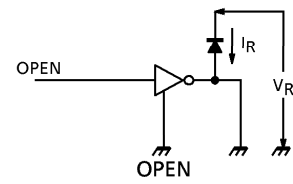
4.  $I_{IN(OFF)}$



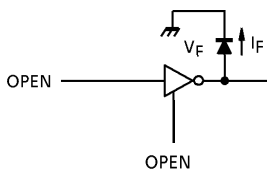
5.  $V_{IN(ON)}$



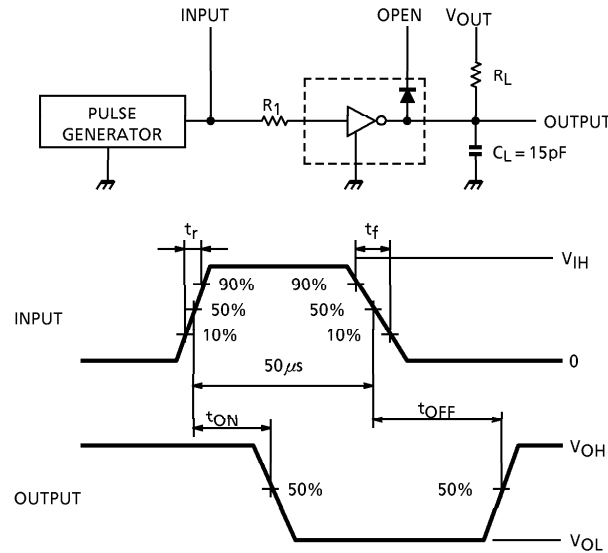
6.  $I_R$



7.  $V_F$



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



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

(Note 2) See below

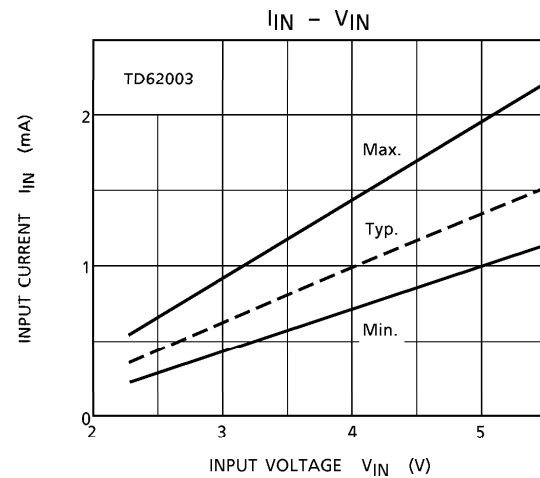
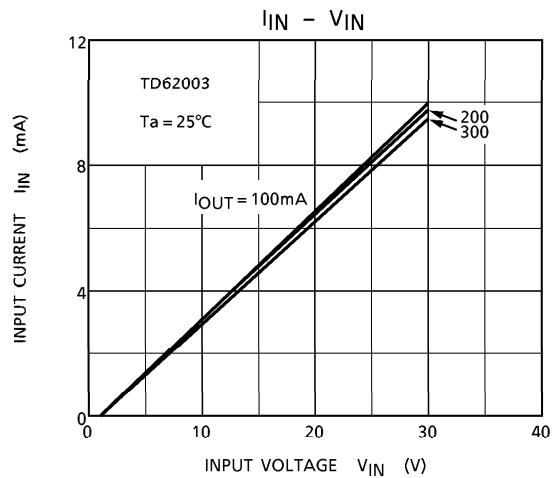
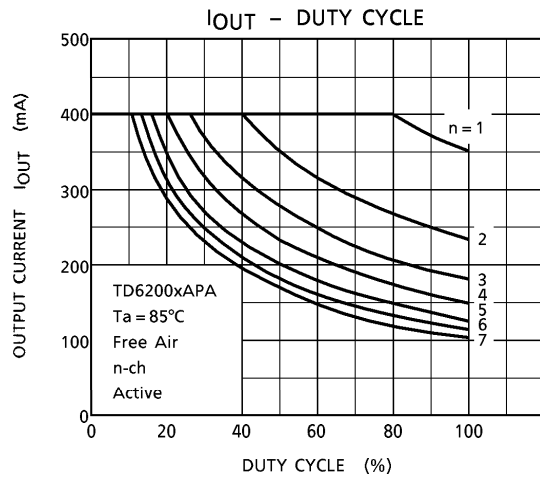
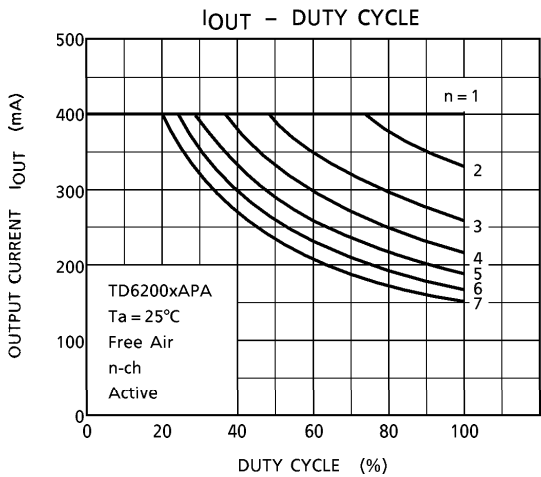
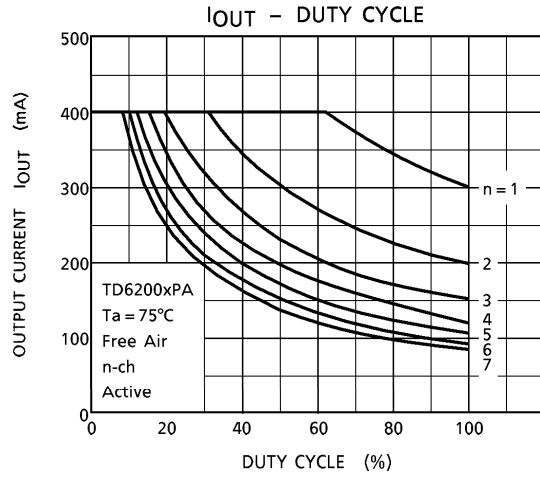
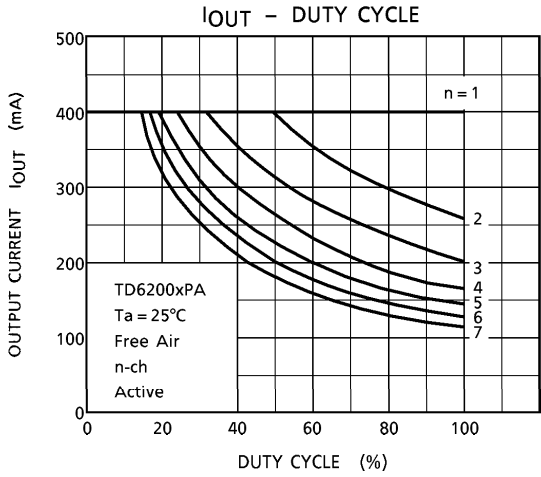
INPUT CONDITION

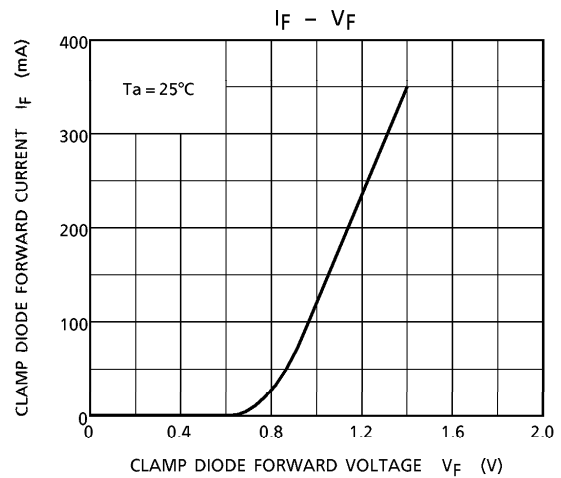
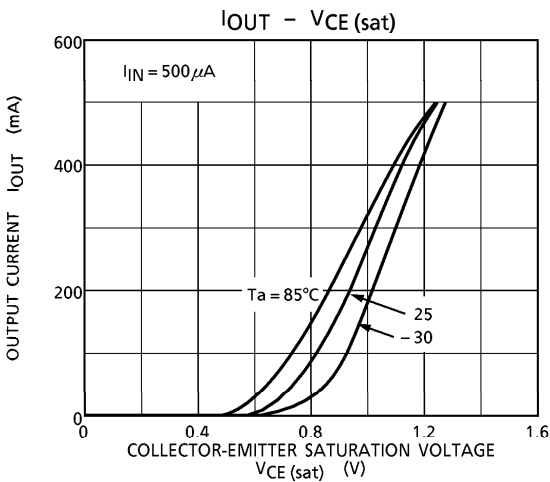
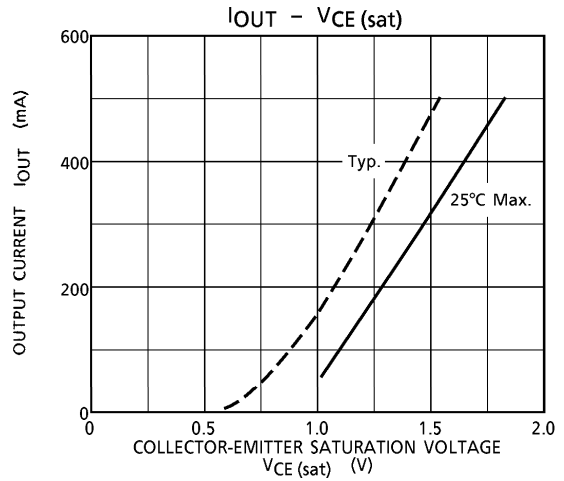
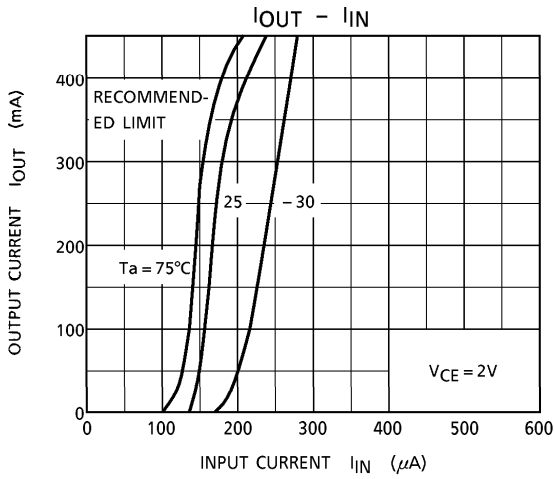
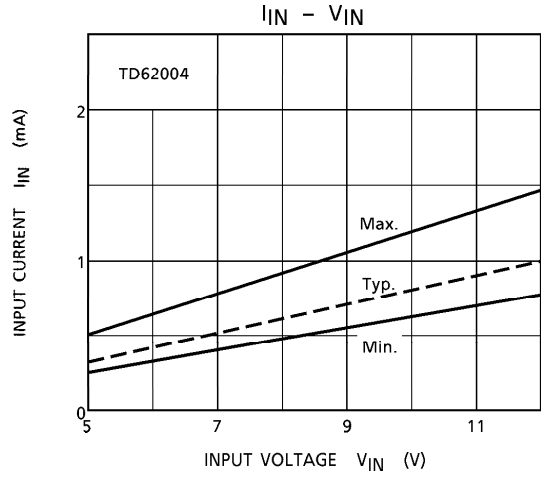
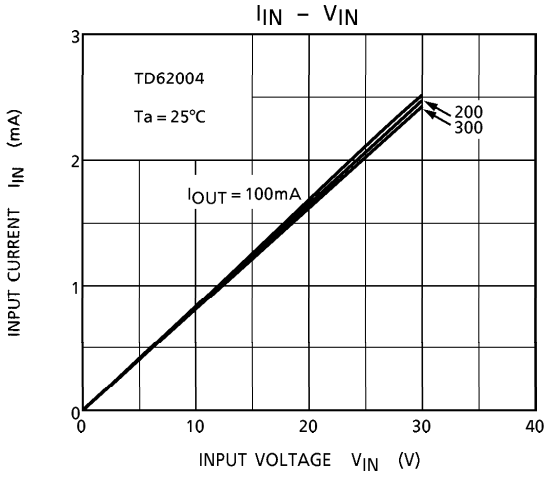
TYPE NUMBER	$R_I$	$V_{IH}$
TD62003PA / APA	0	3V
TD62004PA / APA	0	8V

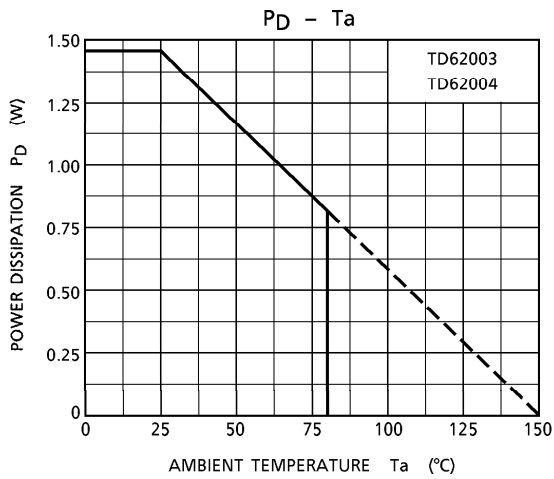
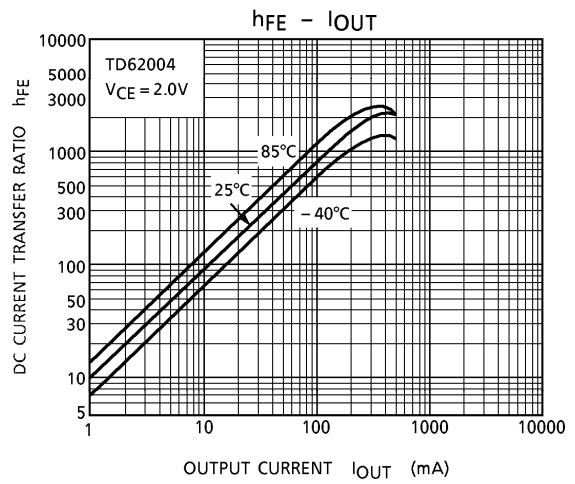
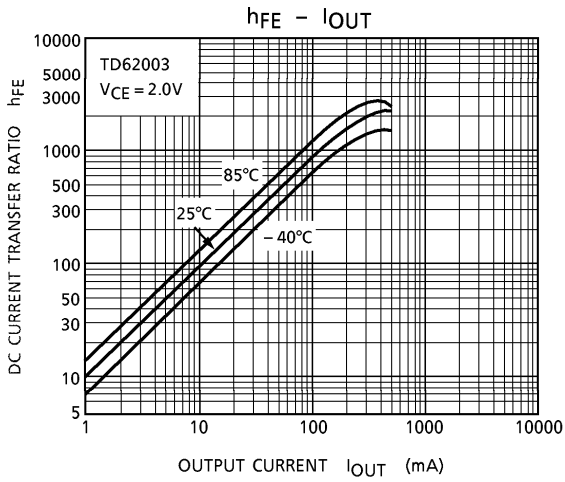
(Note 3)  $C_L$  includes probe and jig capacitance

PRECAUTIONS for USING

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.



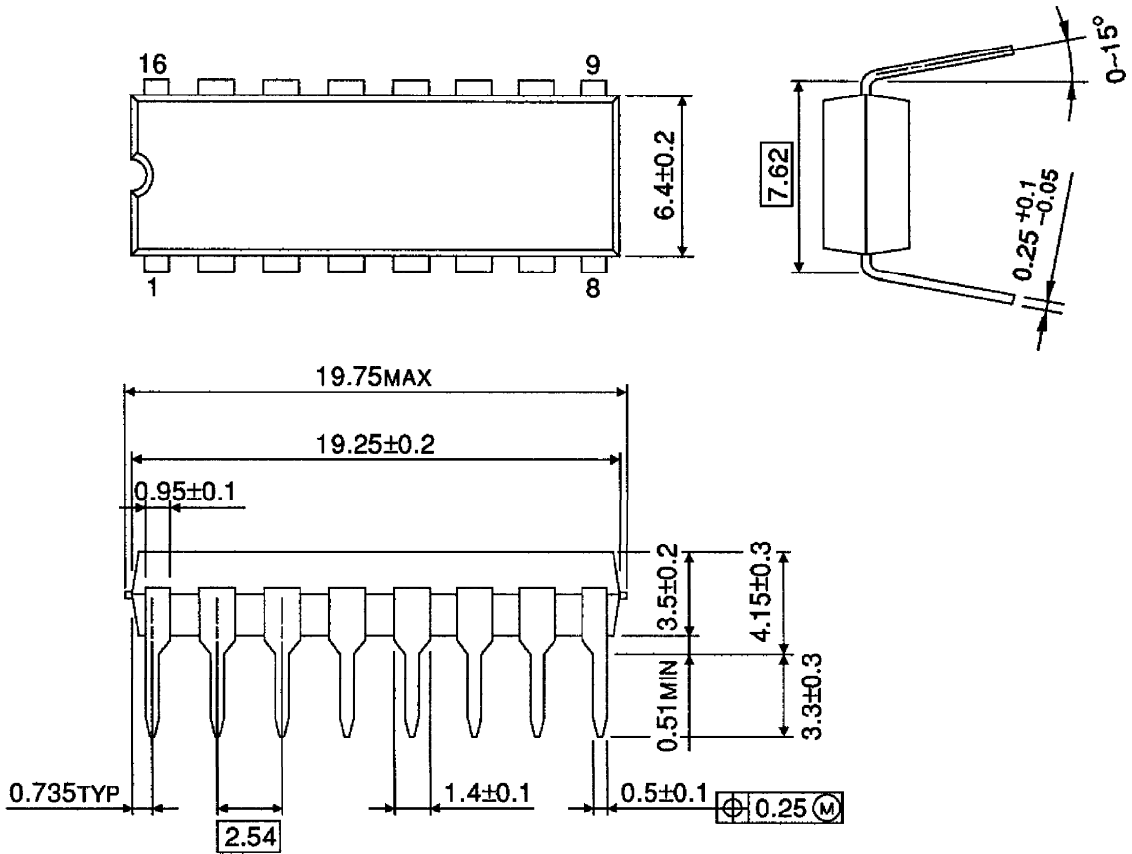






OUTLINE DRAWING  
DIP16-P-300-2.54A

Unit : mm



Weight : 1.11g (Typ.)