

TOSHIBA BIPOLAR DIGITAL INTEGRATED CIRCUIT SILICON MONOLITHIC

## TD62101P,TD62101F,TD62103P,TD62103F TD62104P,TD62104F,TD62105P,TD62105F

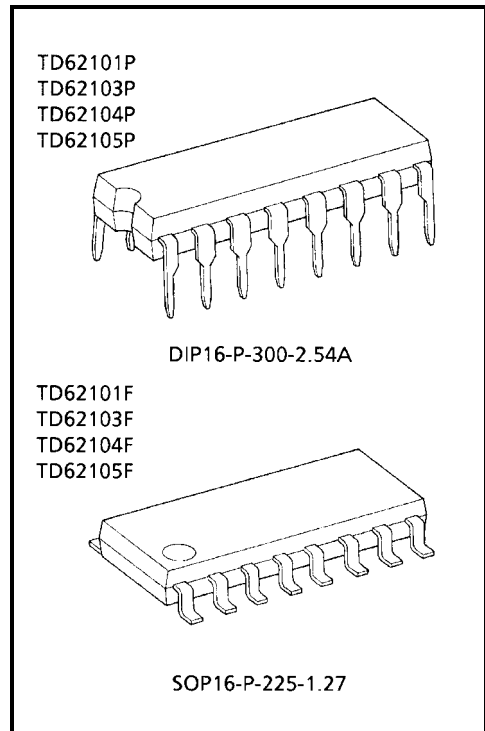
### 7CH DARLINGTON SINK DRIVER

The TD62101P / F series are high-voltage, high-current darlington drivers comprised of seven NPN darlington pairs.

#### FEATURES

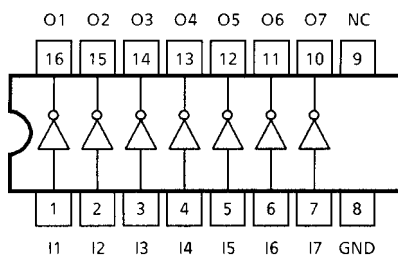
- Output current (single output) : 500 mA (max)
- High sustaining voltage output: 25 V (min)
- Inputs compatible with various types of logic.
- Package type-P : DIP-16 pin.
- Package type-F : SOP-16 pin.

TYPE	INPUT BASE RESISTOR	DESIGNATION
TD62101P / F	External	General Purpose
TD62103P / F	2.7kΩ	TTL, 5 V CMOS
TD62104P / F	10.5kΩ	6~15 V CMOS, PMOS
TD62105P / F	20kΩ	12~25 V CMOS, PMOS



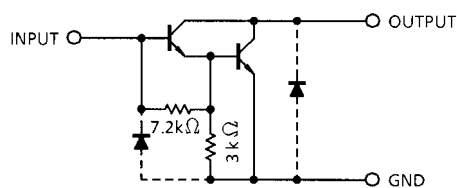
Weight  
 DIP16-P-300-2.54A : 1.11 g (typ.)  
 SOP16-P-225-1.27 : 0.16 g (typ.)

#### PIN CONNECTION (TOP VIEW)



#### SCHEMATICS (EACH DRIVER)

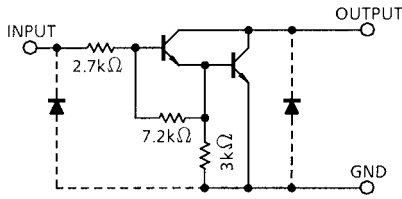
##### TD62101P / F



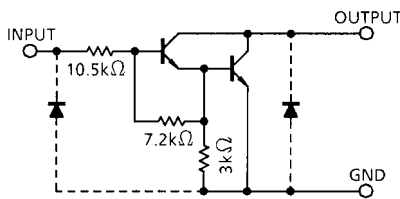
Note: The input and output parasitic diodes cannot be used as clamp diodes.

## SCHEMATICS (EACH DRIVER)

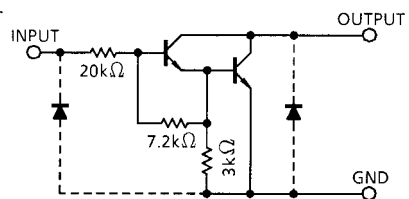
### TD62103P / F



### TD62104P / F



### TD62105P / F



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		$V_{CE(SUS)}$	-0.5~25	V
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
Power Dissipation	P	$P_D$	1.0	W
	F		0.625 (Note 3)	
Operating Temperature	P	$T_{opr}$	-30~75	°C
	F		-40~85	
Storage Temperature		$T_{stg}$	-55~150	°C

Note 1: Except TD62101P / F

Note 2: Only TD62101P / F

Note 3: On Glass Epoxy PCB (30 × 30 × 1.6 mm 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		$V_{CE(SUS)}$		0	—	25	V
Output Current		$I_{OUT}$	DC 1 Circuit	0	—	350	mA / ch
			$T_{pw} = 25$ ms, Duty = 10% 7 Circuits, Ta = 85°C, Tj = 120°C	0	—	300	
Input Voltage	Except TD62101P / F	$V_{IN}$		0	—	20	V
Input Current	Only TD62101P / F	$I_{IN}$		—	—	10	mA
Power Dissipation	P	$P_D$		—	—	0.44	W
	F		(Note)	—	—	0.325	

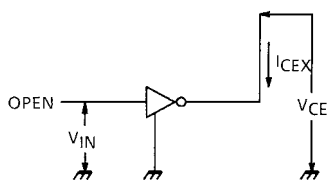
Note: On Glass Epoxy PCB (30 × 30 × 1.6 mm Cu 50%)

## ELECTRICAL CHARACTERISTICS (Ta = 25°C)

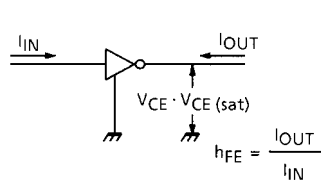
CHARACTERISTIC		SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN	TYP.	MAX	UNIT									
Output Leakage Current	P	I <sub>CEX</sub>	1	V <sub>CE</sub> = 25 V I <sub>IN</sub> = 0	—	—	100	μA									
	F						100										
Collector-Emitter Saturation Voltage		V <sub>CE (sat)</sub>	2	I <sub>OUT</sub> = 350 mA, I <sub>IN</sub> = 600 μA	—	1.3	2.2	V									
				I <sub>OUT</sub> = 200 mA, I <sub>IN</sub> = 400 μA	—	1.1	2.0										
				I <sub>OUT</sub> = 100 mA, I <sub>IN</sub> = 200 μA	—	1.0	1.8										
DC Current Transfer Ratio		h <sub>FE</sub>	2	V <sub>CE</sub> = 2 V, I <sub>OUT</sub> = 350 mA	1000	—	—										
Input Current	Output On	I <sub>IN (ON)</sub>	3	V <sub>CE</sub> = 2 V	—	—	—	mA									
									TD62101P / F	V <sub>IN</sub> = 1.5 V, I <sub>OUT</sub> = 350 mA	—	0.25	—				
									TD62103P / F	V <sub>IN</sub> = 1.75 V, I <sub>OUT</sub> = 350 mA	—	1.00	—				
									TD62104P / F	V <sub>IN</sub> = 2.4 V, I <sub>OUT</sub> = 350 mA	—	0.4	0.7				
									TD62105P / F	V <sub>IN</sub> = 13.5 V, I <sub>OUT</sub> = 350 mA	—	1.2	1.7				
	Output Off	I <sub>IN (OFF)</sub>	4	I <sub>OUT</sub> = 500 μA	—	—	—	—	μA								
										P	Ta = 75°C	50	65	—			
										F	Ta = 85°C	50	65	—			
										TD62103P / F	I <sub>OUT</sub> = 125 mA	—	—	2.1			
										TD62104P / F	I <sub>OUT</sub> = 125 mA	—	—	4			
Input Voltage	Output On	V <sub>IN (ON)</sub>	5	V <sub>CE</sub> = 2 V	—	—	—	V									
									TD62105P / F	I <sub>OUT</sub> = 125 mA	—	—	6.4				
									TD62103P / F	I <sub>OUT</sub> = 250 mA	—	—	2.7				
									TD62104P / F	I <sub>OUT</sub> = 250 mA	—	—	7				
									TD62105P / F	I <sub>OUT</sub> = 250 mA	—	—	12				
									TD62103P / F	I <sub>OUT</sub> = 350 mA	—	—	3.3				
									TD62104P / F	I <sub>OUT</sub> = 350 mA	—	—	8.8				
									TD62105P / F	I <sub>OUT</sub> = 350 mA	—	—	15				
									Input Capacitance		C <sub>IN</sub>	6	V <sub>IN</sub> = 0, f = 1 MHz	—	15	—	pF
									Turn-On Delay		t <sub>ON</sub>	7	V <sub>OUT</sub> = 25 V, R <sub>L</sub> = 70 Ω C <sub>L</sub> = 15 pF	—	0.1	—	μs
Turn-Off Delay		t <sub>OFF</sub>	—	0.2	—												

## TEST CIRCUIT

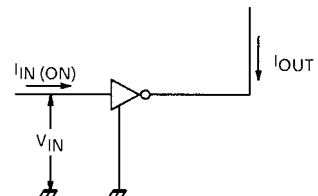
### 1. I<sub>CEX</sub>



### 2. h<sub>FE</sub>, V<sub>CE (sat)</sub>

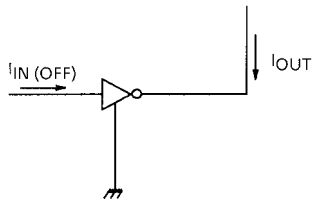


### 3. I<sub>IN (ON)</sub>

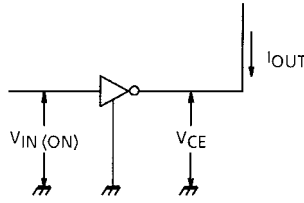


## TEST CIRCUIT

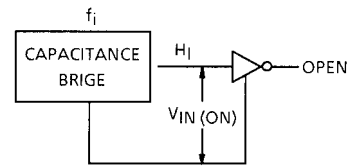
### 4. $I_{IN}$ (OFF)



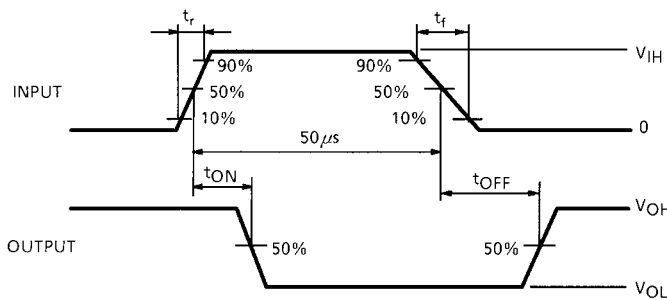
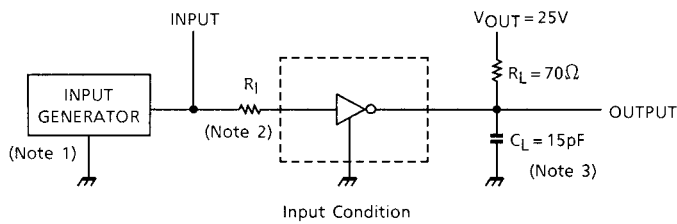
### 5. $V_{IN}$ (ON)



### 6. $C_{IN}$



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



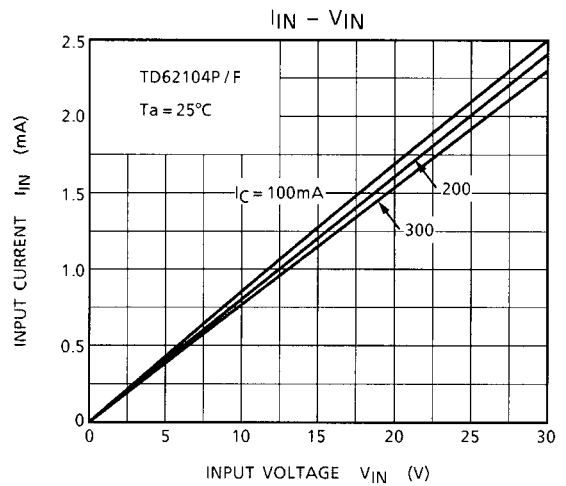
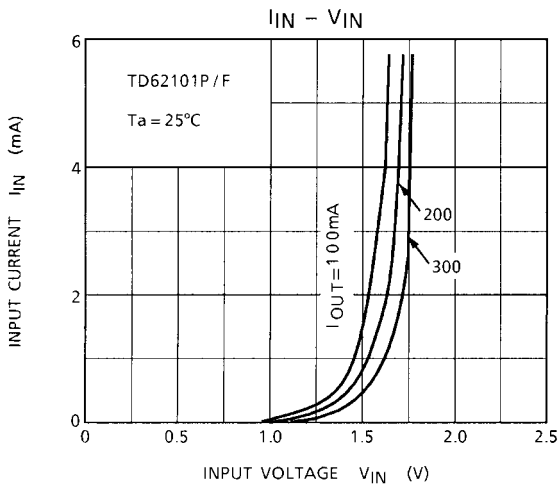
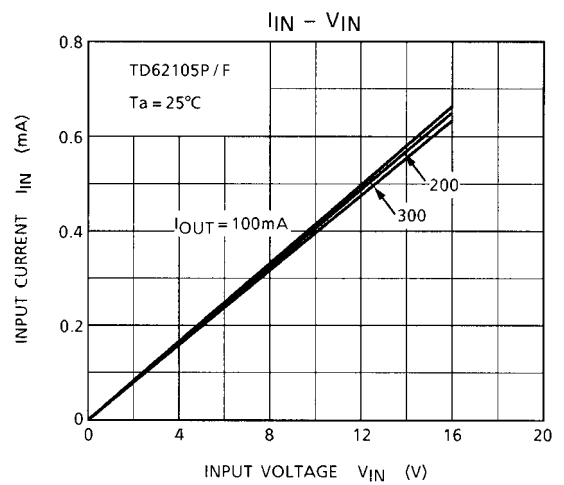
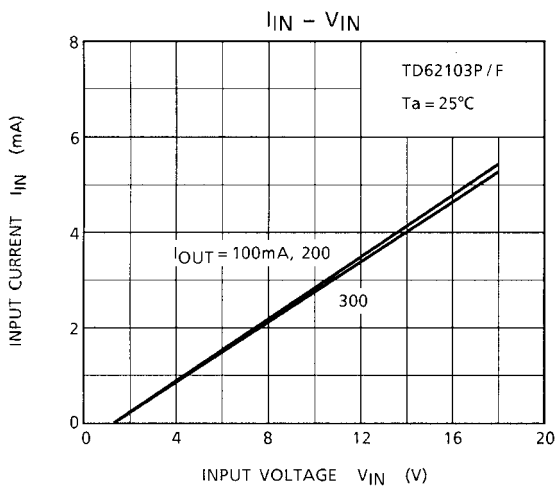
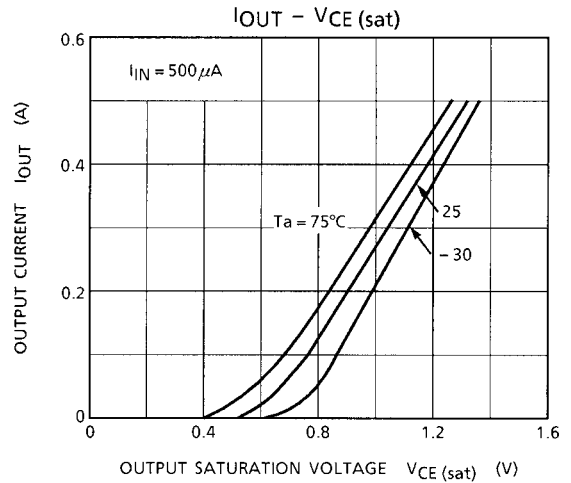
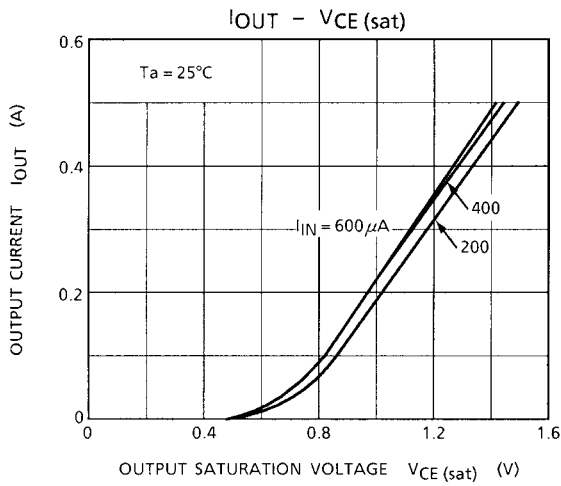
- Note 1: Pulse Width 50  $\mu$ s, Duty Cycle 10%  
 Output Impedance 50  $\Omega$ ,  $t_r \leq 5$  ns,  $t_f \leq 10$  ns  
 Note 2: See right.  
 Note 3:  $C_L$  includes probe and jig capacitance.

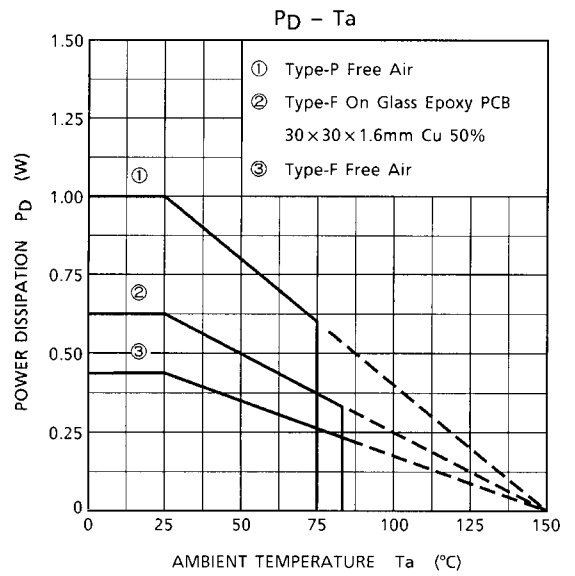
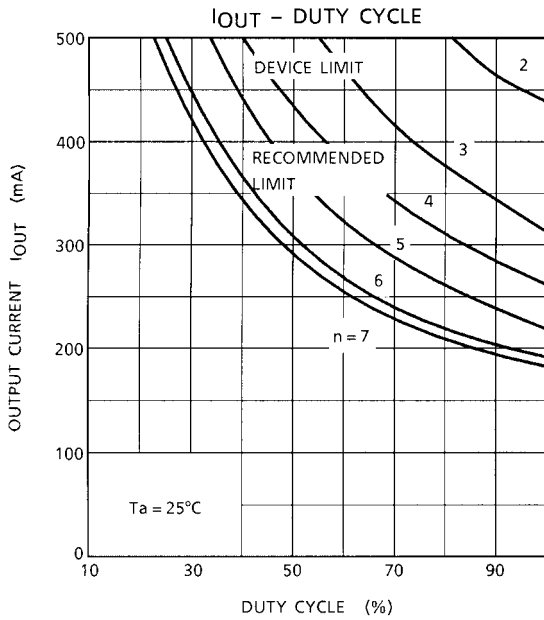
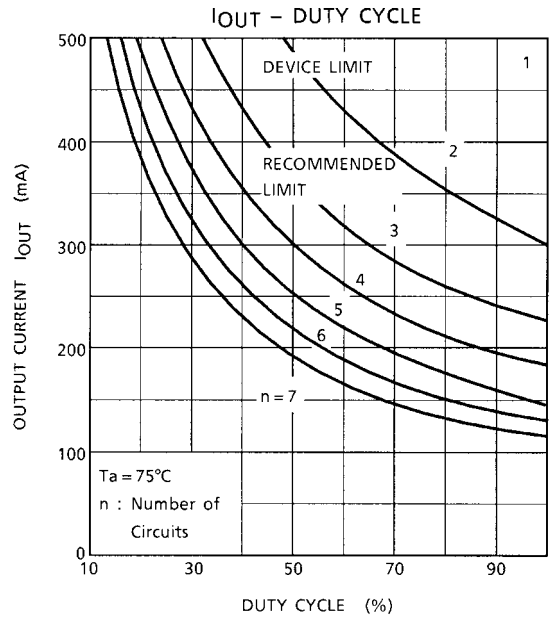
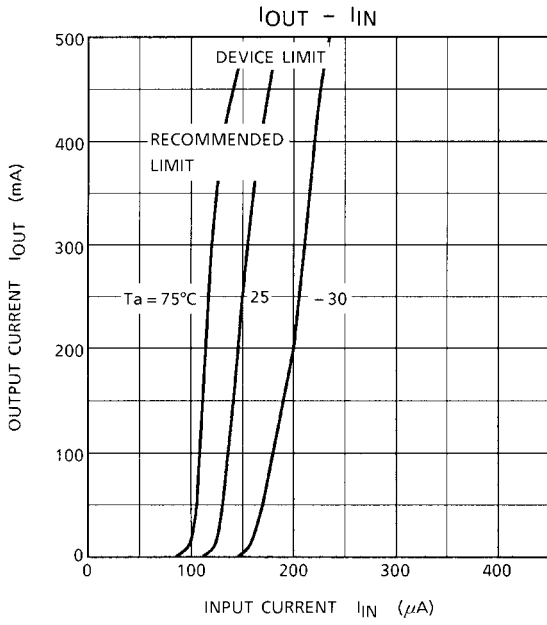
### INPUT CONDITION

TYPE NUMBER	$R_I$	$V_{IH}$
TD62101P / F	2.7 k $\Omega$	3 V
TD62103P / F	0 $\Omega$	3 V
TD62104P / F	0 $\Omega$	8 V
TD62105P / F	0 $\Omega$	15 V

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

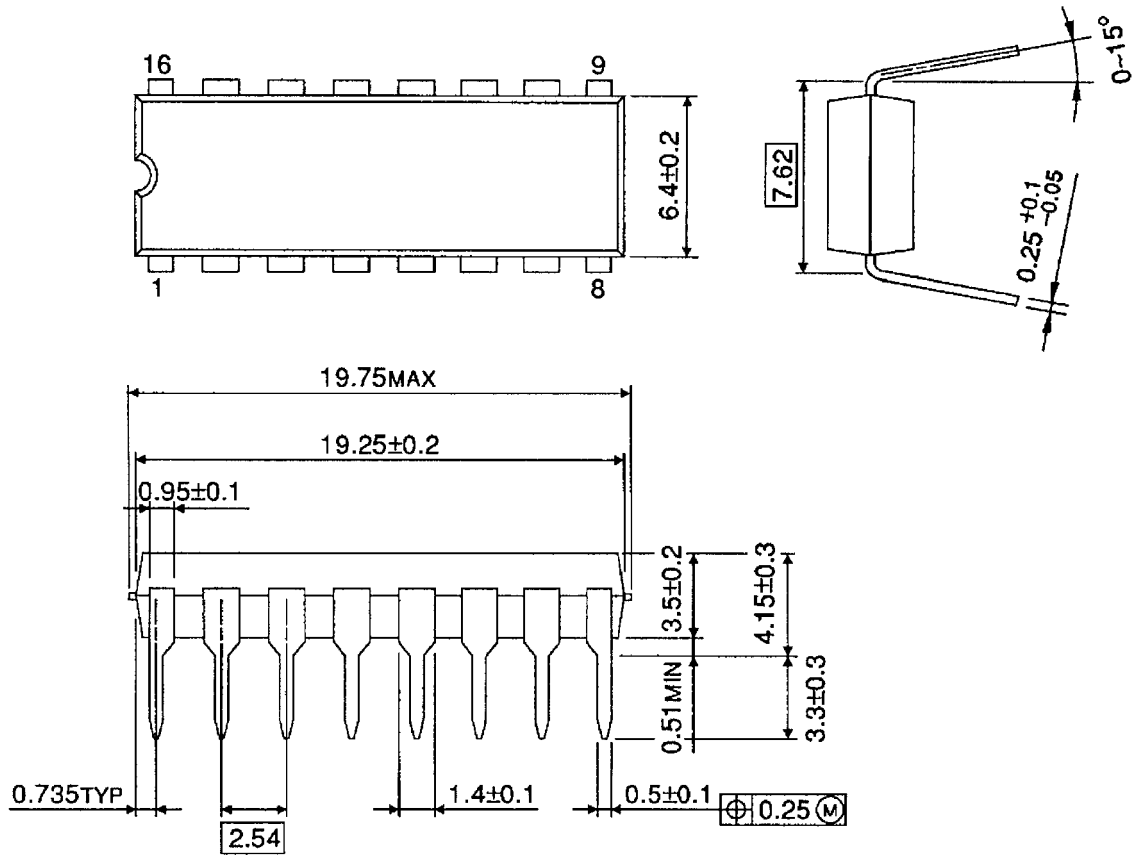




## PACKAGE DIMENSIONS

DIP16-P-300-2.54A

Unit: mm

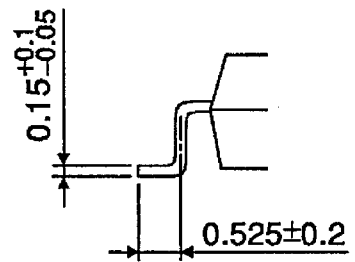
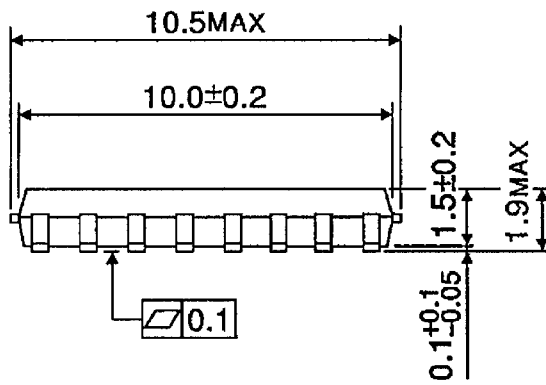
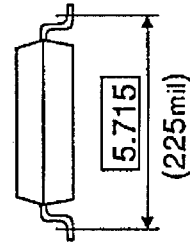
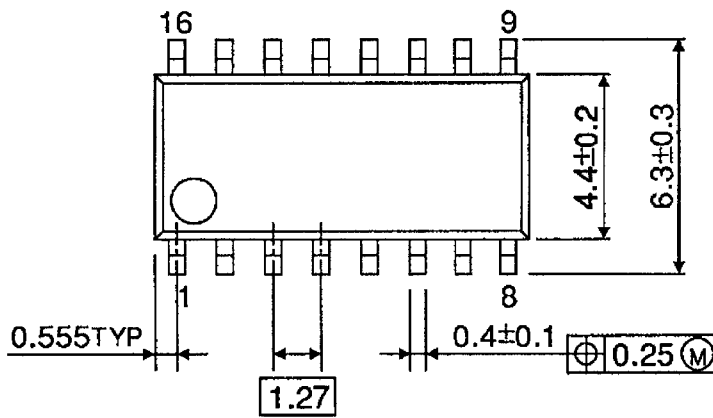


Weight: 1.11 g (typ.)

## PACKAGE DIMENSIONS

SOP16-P-225-1.27

Unit: mm



Weight: 0.16 g (typ.)



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000707EBA

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