

TOSHIBA BIPOLAR DIGITAL INTEGRATED CIRCUIT SILICON MONOLITHIC

## TD62101PG,TD62101FG,TD62103PG,TD62103FG TD62104PG,TD62104FG,TD62105PG,TD62105FG

### 7CH DARLINGTON SINK DRIVER

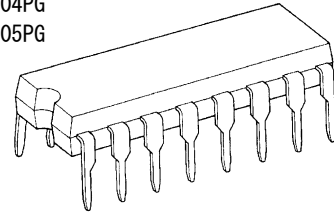
The TD62101PG / FG series are high-voltage, high-current darlington drivers comprised of seven NPN darlington pairs. This devices are a product for the Pb free(Sn-Ag).

### FEATURES

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

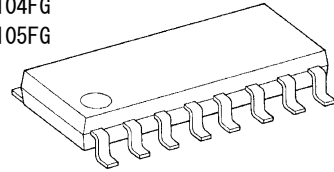
TYPE	INPUT BASE RESISTOR	DESIGNATION
TD62101PG / FG	External	General Purpose
TD62103PG / FG	2.7k $\Omega$	TTL, 5 V CMOS
TD62104PG / FG	10.5k $\Omega$	6~15 V CMOS, PMOS
TD62105PG / FG	20k $\Omega$	12~25 V CMOS, PMOS

TD62101PG  
TD62103PG  
TD62104PG  
TD62105PG



DIP16-P-300-2.54A

TD62101FG  
TD62103FG  
TD62104FG  
TD62105FG



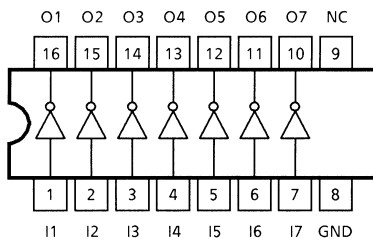
SOP16-P-225-1.27

Weight

DIP16-P-300-2.54A : 1.11 g (typ.)

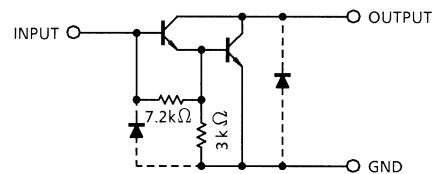
SOP16-P-225-1.27 : 0.16 g (typ.)

### PIN CONNECTION (TOP VIEW)



### SCHEMATICS (EACH DRIVER)

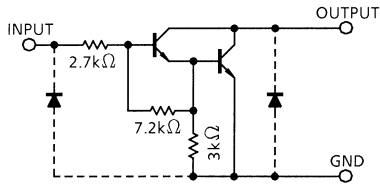
#### TD62101PG / FG



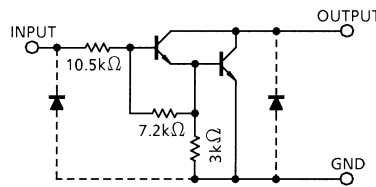
Note: The input and output parasitic diodes cannot be used as clamp diodes.

## SCHEMATICS (EACH DRIVER)

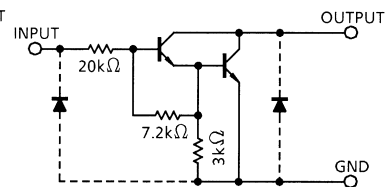
TD62103PG / FG



TD62104PG / FG



TD62105PG / FG



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	PG	$P_D$	1.0	W
	FG		0.625 (Note 3)	
Operating Temperature	PG	$T_{opr}$	-30~75	°C
	FG		-40~85	
Storage Temperature		$T_{stg}$	-55~150	°C

Note 1: Except TD62101PG / FG

Note 2: Only TD62101PG / FG

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
			$T_{pw} = 25 \text{ ms}$ , Duty = 10% 7 Circuits, Ta = 85°C, Tj = 120°C	0	—	300	
Input Voltage	Except TD62101PG / FG	$V_{IN}$		0	—	20	V
Input Current	Only TD62101PG / FG	$I_{IN}$		—	—	10	mA
Power Dissipation	PG	$P_D$		—	—	0.44	W
	FG		(Note)	—	—	0.325	

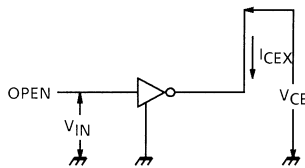
Note: On Glass Epoxy PCB (30 × 30 × 1.6 mm Cu 50%)

## ELECTRICAL CHARACTERISTICS (Ta = 25°C)

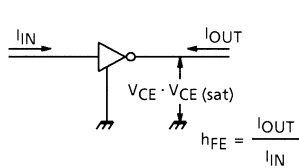
CHARACTERISTIC			SYMBOL	TEST CIR- CUIT	TEST CONDITION	MIN	TYP.	MAX	UNIT	
Output Leakage Current		PG	I <sub>CEX</sub>	1	V <sub>CE</sub> = 25 V I <sub>IN</sub> = 0	Ta = 75°C	—	—	100	μA
		FG				Ta = 85°C	—	—	100	
Collector–Emitter Saturation Voltage			V <sub>CE (sat)</sub>	2	I <sub>OUT</sub> = 350 mA, I <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	TD62101PG / FG	I <sub>IN (ON)</sub>	3	V <sub>IN</sub> = 1.5 V, I <sub>OUT</sub> = 350 mA	—	0.25	—	mA	
		V <sub>IN</sub> = 1.75 V, I <sub>OUT</sub> = 350 mA			—	1.00	—			
		TD62103PG / FG			V <sub>IN</sub> = 2.4 V, I <sub>OUT</sub> = 350 mA	—	0.4	0.7		
		TD62104PG / FG			V <sub>IN</sub> = 13.5 V, I <sub>OUT</sub> = 350 mA	—	1.2	1.7		
		TD62105PG / FG			V <sub>IN</sub> = 20.0 V, I <sub>OUT</sub> = 350 mA	—	1.0	1.5		
	Output Off	PG	I <sub>IN (OFF)</sub>	4	I <sub>OUT</sub> = 500 μA	Ta = 75°C	50	65	—	μA
		FG				Ta = 85°C	50	65	—	
Input Voltage	Output On	TD62103PG / FG	V <sub>IN (ON)</sub>	5	V <sub>CE</sub> = 2 V	I <sub>OUT</sub> = 125 mA	—	—	2.1	V
		TD62104PG / FG					—	—	4	
		TD62105PG / FG					—	—	6.4	
		TD62103PG / FG				I <sub>OUT</sub> = 250 mA	—	—	2.7	
		TD62104PG / FG					—	—	7	
		TD62105PG / FG					—	—	12	
		TD62103PG / FG				I <sub>OUT</sub> = 350 mA	—	—	3.3	
		TD62104PG / FG					—	—	8.8	
		TD62105PG / FG					—	—	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

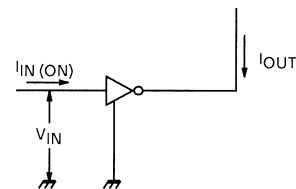
### 1. $I_{CEX}$



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

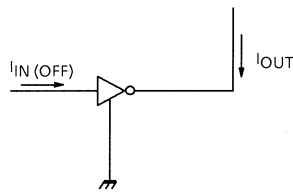


### 3. $I_{IN}(\text{ON})$

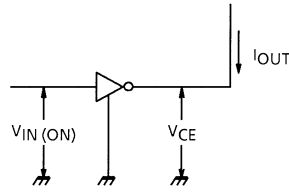


## TEST CIRCUIT

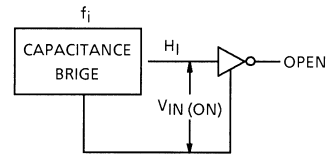
### 4. $I_{IN}$ (OFF)



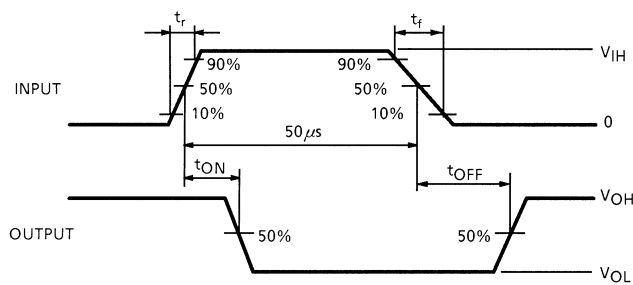
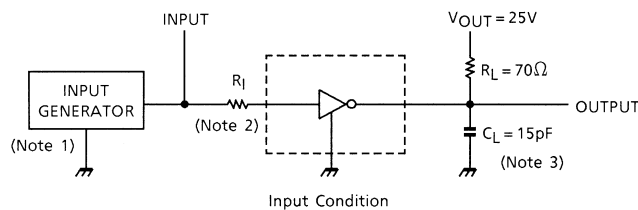
### 5. $V_{IN}$ (ON)



### 6. $C_{IN}$



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



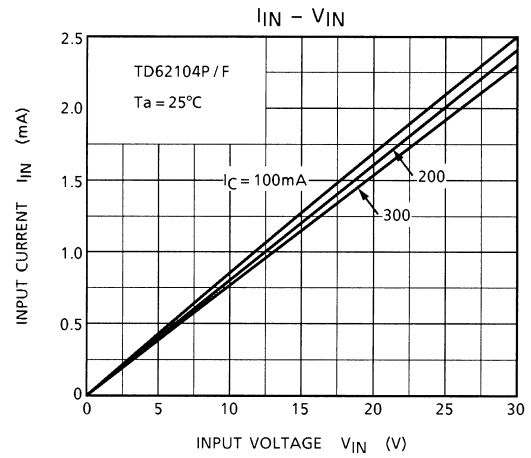
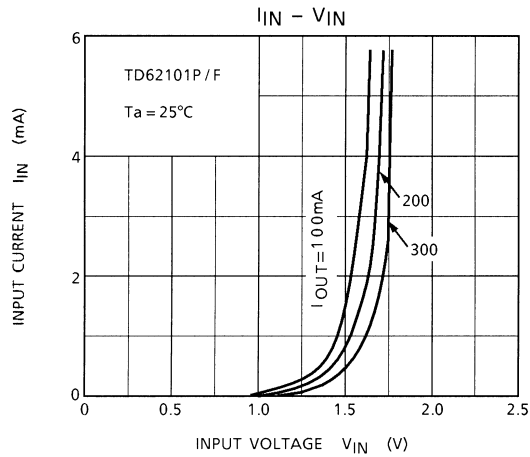
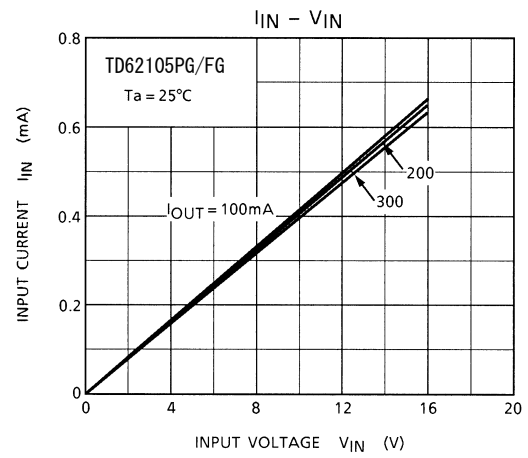
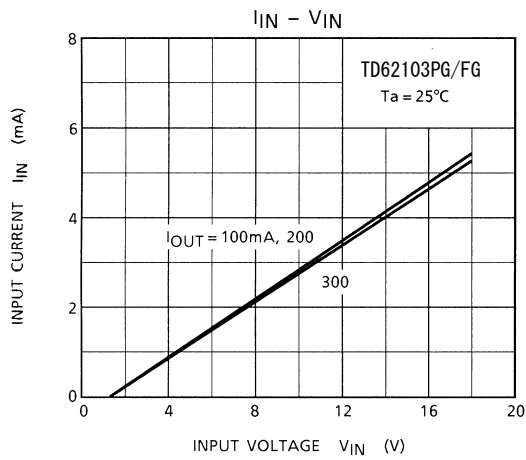
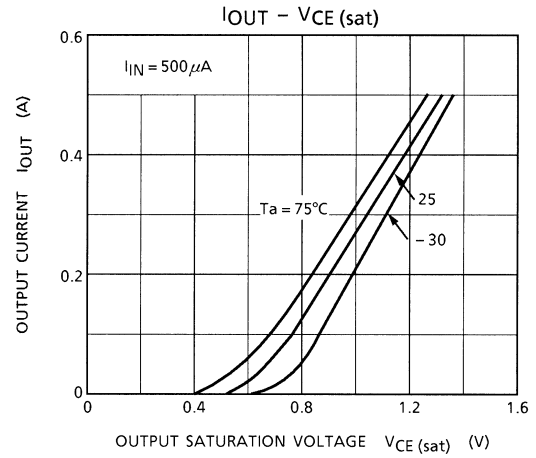
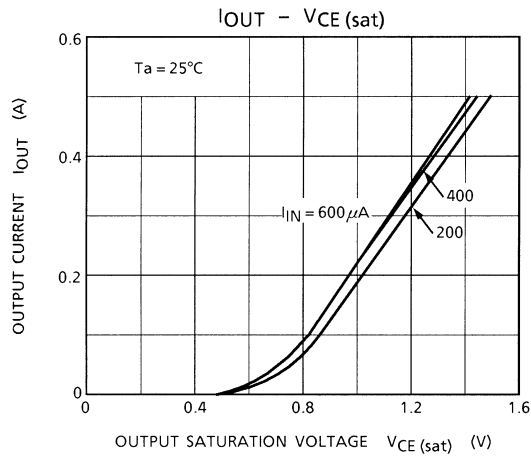
Note 1: Pulse Width 50  $\mu$ s, Duty Cycle 10%  
Output Impedance 50  $\Omega$ ,  $t_r \leq 5$  ns,  $t_f \leq 10$  ns  
Note 2: See right.  
Note 3:  $C_L$  includes probe and jig capacitance.

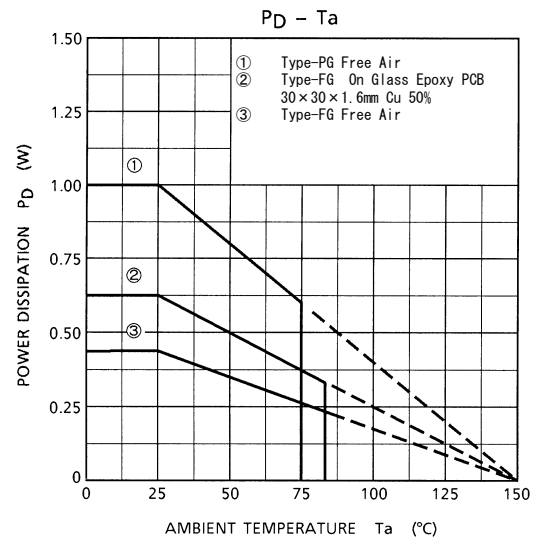
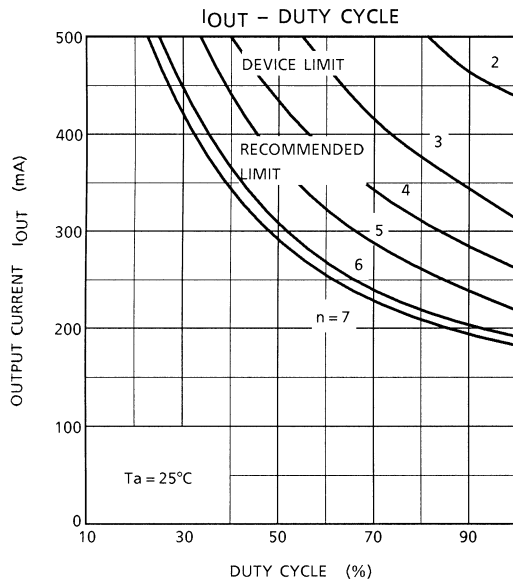
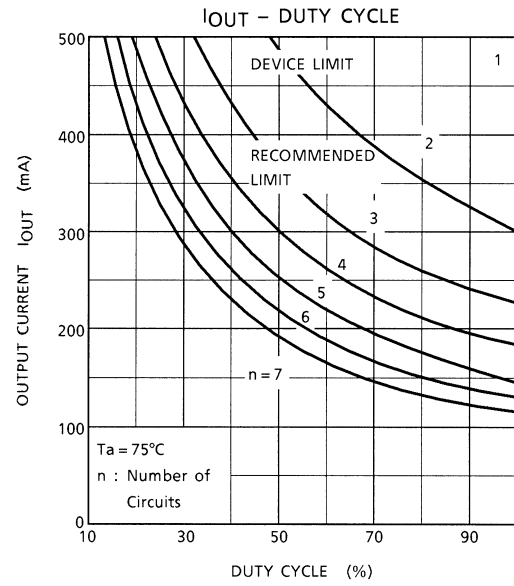
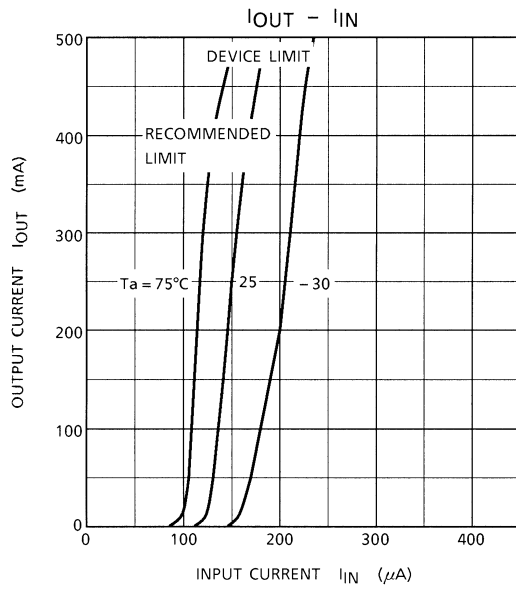
## INPUT CONDITION

TYPE NUMBER	$R_I$	$V_{IH}$
TD62101PG / FG	2.7 k $\Omega$	3 V
TD62103PG / FG	0 $\Omega$	3 V
TD62104PG / FG	0 $\Omega$	8 V
TD62105PG / FG	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.

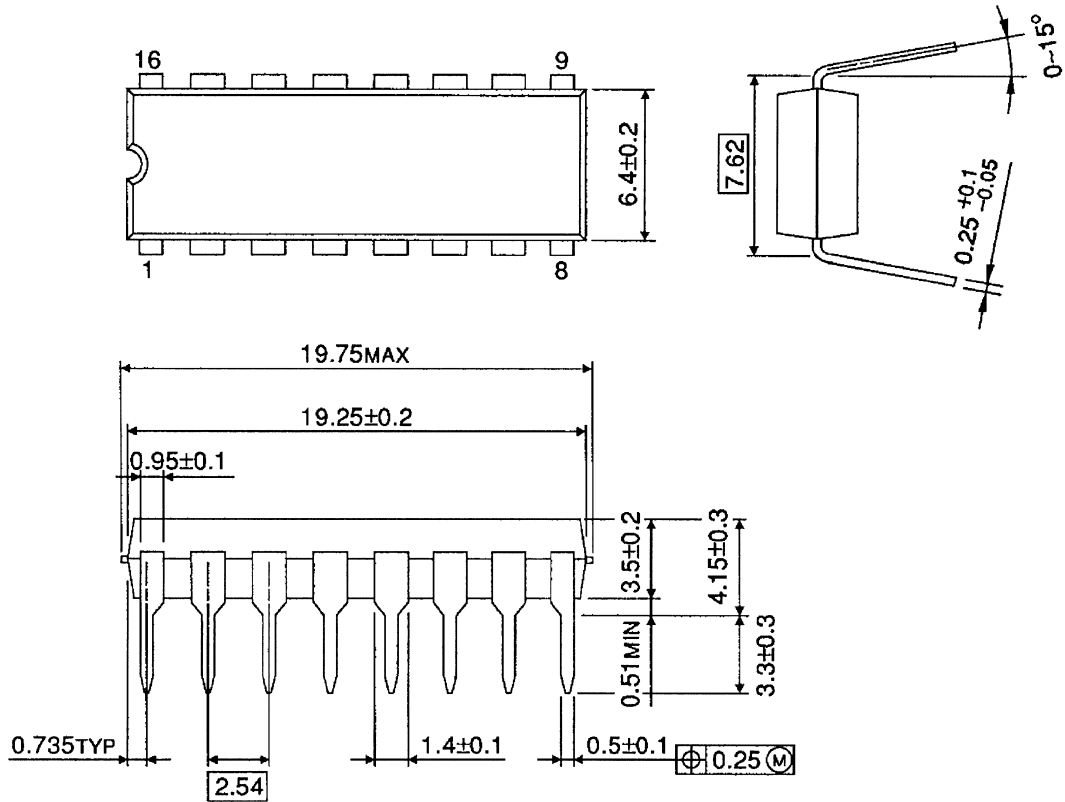




## PACKAGE DIMENSIONS

DIP16-P-300-2.54A

Unit: mm

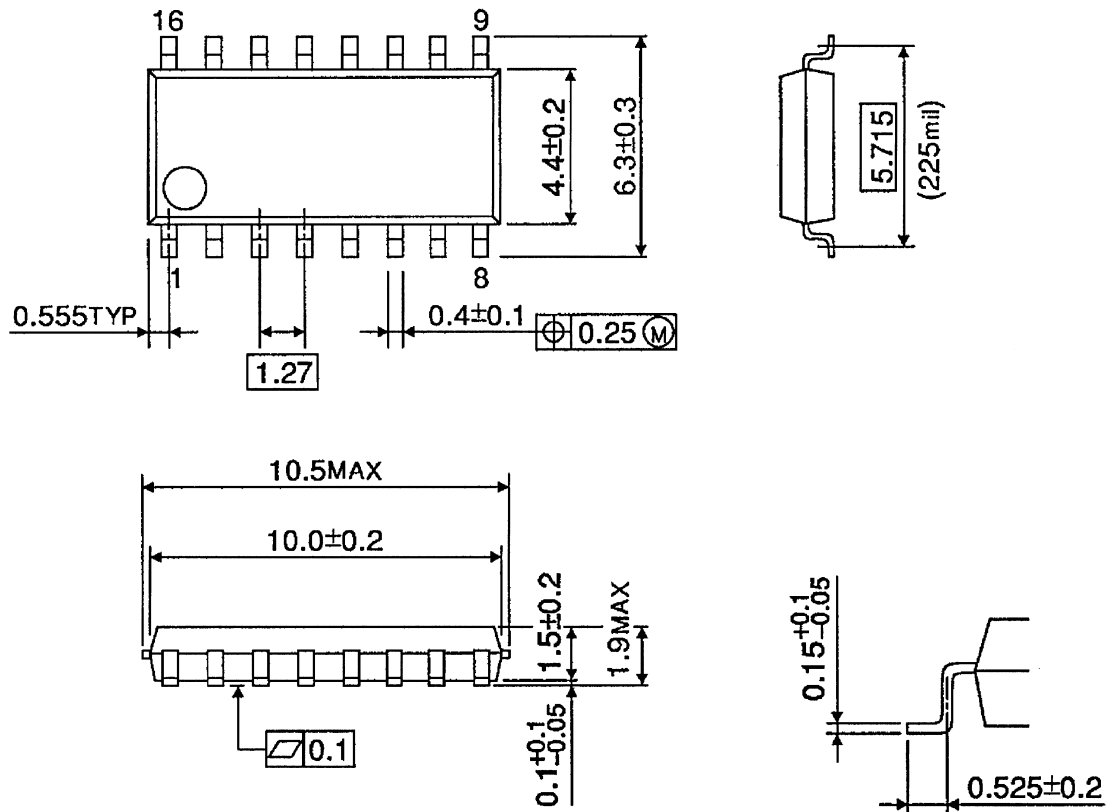


Weight: 1.11 g (typ.)

## PACKAGE DIMENSIONS

SOP16-P-225-1.27

Unit: mm



Weight: 0.16 g (typ.)



About solderability, following conditions were confirmed

- Solderability

- (1) Use of Sn-63Pb solder Bath

- solder bath temperature = 230°C
    - dipping time = 5 seconds
    - the number of times = once
    - use of R-type flux

- (2) Use of Sn-3.0Ag-0.5Cu solder Bath

- solder bath temperature = 245°C
    - dipping time = 5 seconds
    - the number of times = once
    - use of R-type flux

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