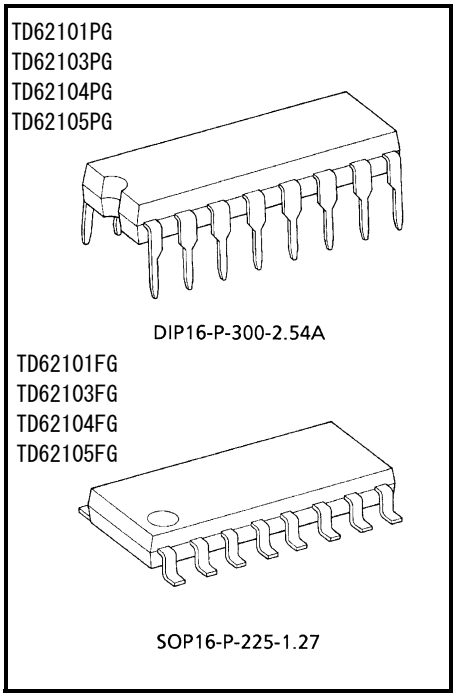
TOSHIBA BIPOLAR DIGITAL INTEGRATED CIRCUIT SILICON MONOLITHIC

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).



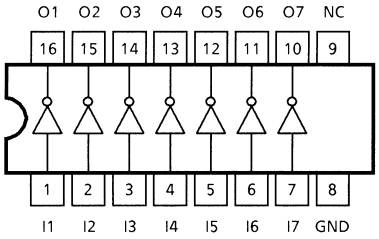
Weight
DIP16−P−300−2.54A : 1.11 g (typ.)
SOP16−P−225−1.27 : 0.16 g (typ.)

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.

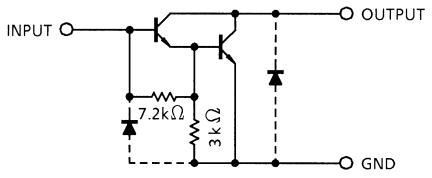
TYPE	INPUT BASE RESISTOR	DESIGNATION
TD62101PG / FG	External	General Purpose
TD62103PG / FG	2.7kΩ	TTL, 5 V CMOS
TD62104PG / FG	10.5kΩ	6~15 V CMOS, PMOS
TD62105PG / FG	20kΩ	12~25 V CMOS, PMOS

PIN CONNECTION (TOP VIEW)



SCHEMATICS (EACH DRIVER)

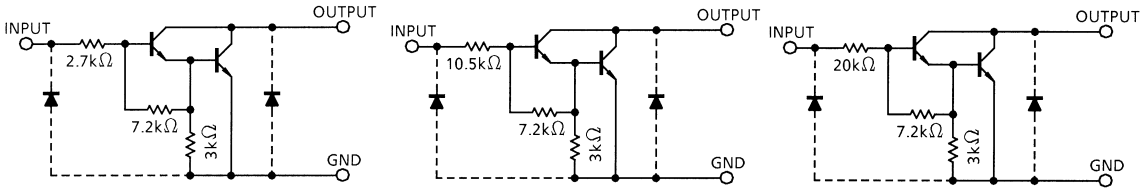
TD62101PG / FG



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 ms, Duty = 10% 7 Circuits, Ta = 85°C, T_j = 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	

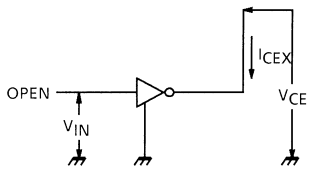
Note: On Glass Epoxy PCB (30 × 30 × 1.6 mm Cu 50%)

ELECTRICAL CHARACTERISTICS (Ta = 25°C)

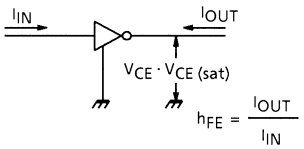
CHARACTERISTIC			SYMBOL	TEST CIR-CUIT	TEST CONDITION		MIN	TYP.	MAX	UNIT
Output Leakage Current		PG	I_{CEX}	1	V_{CE} = 25 V, I_{IN} = 0	Ta = 75°C	—	—	100	μA
		FG				Ta = 85°C	—	—	100	
Collector−Emitter Saturation Voltage			$V_{CE\ (sat)}$	2	I_{OUT} = 350 mA, I_{IN} = 600 μA		—	1.3	2.2	V
					I_{OUT} = 200 mA, I_{IN} = 400 μA		—	1.1	2.0	
					I_{OUT} = 100 mA, I_{IN} = 200 μA		—	1.0	1.8	
DC Current Transfer Ratio			h_{FE}	2	V_{CE} = 2 V, I_{OUT} = 350 mA		1000	—	—	
Input Current	Output On	TD62101PG / FG	$I_{IN\ (ON)}$	3	V_{IN} = 1.5 V, I_{OUT} = 350 mA		—	0.25	—	mA
					V_{IN} = 1.75 V, I_{OUT} = 350 mA		—	1.00	—	
		TD62103PG / FG			V_{IN} = 2.4 V, I_{OUT} = 350 mA		—	0.4	0.7	
		TD62104PG / FG			V_{IN} = 13.5 V, I_{OUT} = 350 mA		—	1.2	1.7	
		TD62105PG / FG			V_{IN} = 20.0 V, I_{OUT} = 350 mA		—	1.0	1.5	
	Output Off	PG	$I_{IN\ (OFF)}$	4	I_{OUT} = 500 μA	Ta = 75°C	50	65	—	μA
		FG				Ta = 85°C	50	65	—	
Input Voltage	Output On	TD62103PG / FG	$V_{IN\ (ON)}$	5	V_{CE} = 2 V	I_{OUT} = 125 mA	—	—	2.1	V
		TD62104PG / FG					—	—	4	
		TD62105PG / FG					—	—	6.4	
		TD62103PG / FG				I_{OUT} = 250 mA	—	—	2.7	
		TD62104PG / FG					—	—	7	
		TD62105PG / FG					—	—	12	
		TD62103PG / FG				I_{OUT} = 350 mA	—	—	3.3	
		TD62104PG / FG					—	—	8.8	
		TD62105PG / FG					—	—	15	
Input Capacitance			C_{IN}	6	V_{IN} = 0, f = 1 MHz		—	15	—	pF
Turn−On Delay			t_{ON}	7	V_{OUT} = 25 V, R_L = 70 Ω, C_L = 15 pF		—	0.1	—	μs
Turn−Off Delay			t_{OFF}				—	0.2	—	

TEST CIRCUIT

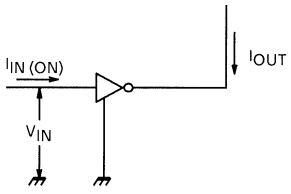
1. I_{CEX}



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

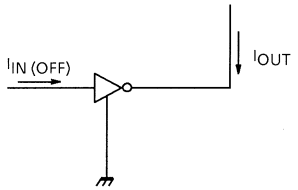


3. $I_{IN\ (ON)}$

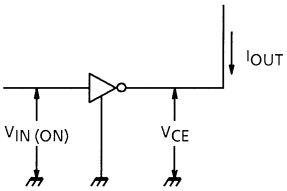


TEST CIRCUIT

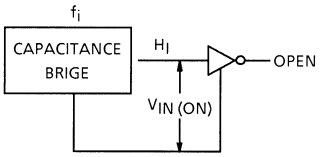
4. $I_{IN\ (OFF)}$



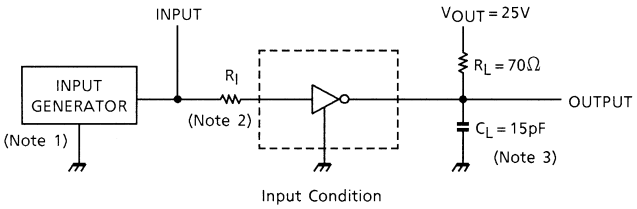
5. $V_{IN\ (ON)}$

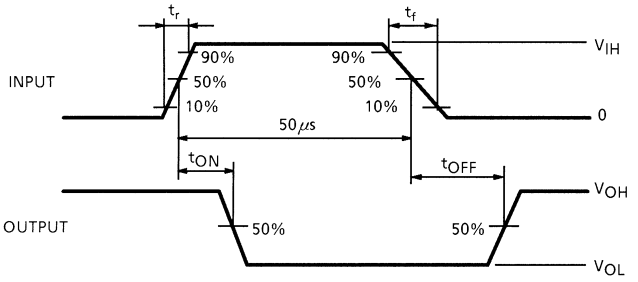


6. C_{IN}



7. t_{ON}, t_{OFF}





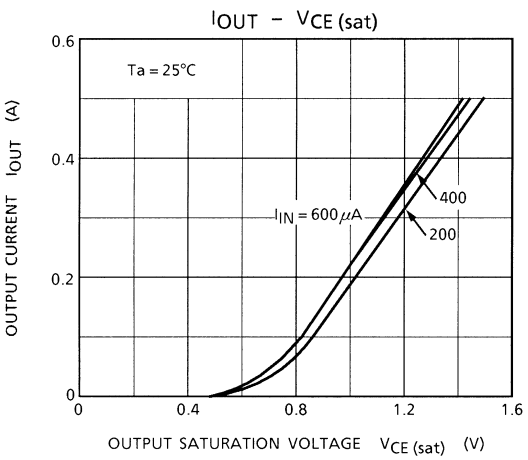
Note 1: Pulse Width 50 μs, Duty Cycle 10%
Output Impedance 50 Ω, $t_r \leq 5$ ns, $t_f \leq 10$ ns
Note 2: See right.
Note 3: C_L includes probe and jig capacitance.

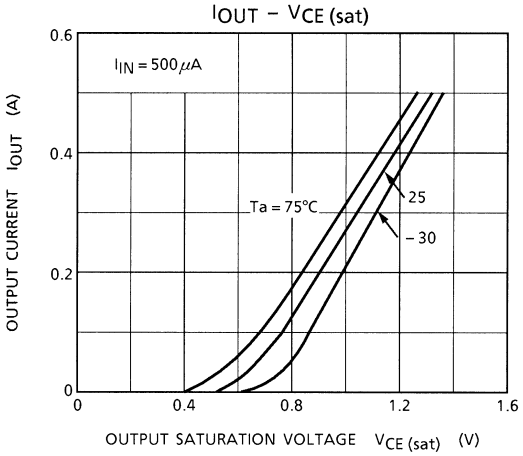
INPUT CONDITION

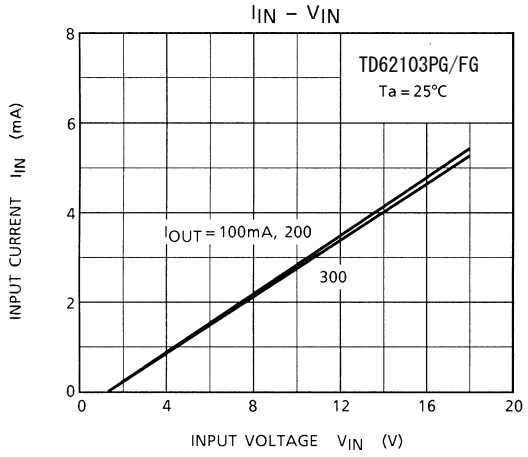
TYPE NUMBER	R_I	V_{IH}
TD62101PG / FG	2.7 kΩ	3 V
TD62103PG / FG	0 Ω	3 V
TD62104PG / FG	0 Ω	8 V
TD62105PG / FG	0 Ω	15 V

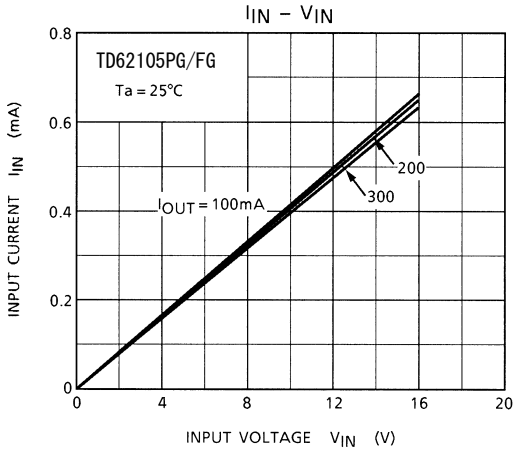
PRECAUTIONS for USING

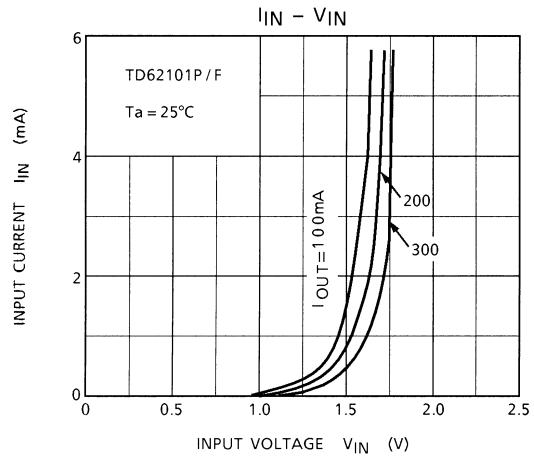
This IC does not include built-in protection circuits for excess current or overvoltage.
If this IC is subjected to excess current or overvoltage, it may be destroyed.
Hence, the utmost care must be taken when systems which incorporate this IC are designed.
Utmost care is necessary in the design of the output line, GND line since IC may be destroyed due to short−circuit between outputs, air contamination fault, or fault by improper grounding.

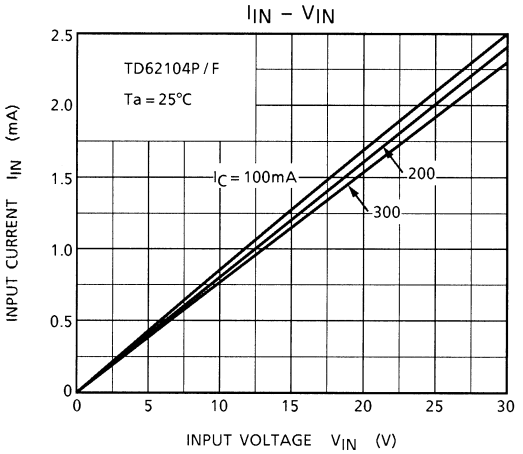

I_{OUT} – $V_{CE\ (sat)}$
Ta = 25°C
I_{IN} = 600μA
400
200
OUTPUT CURRENT I_{OUT} (A)
OUTPUT SATURATION VOLTAGE $V_{CE\ (sat)}$ (V)

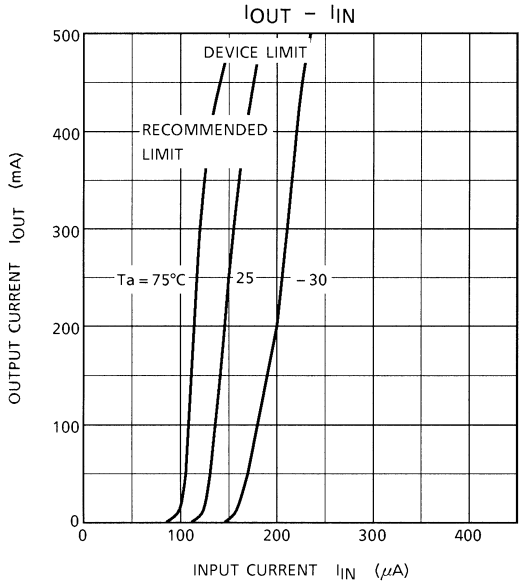

I_{OUT} – $V_{CE\ (sat)}$
I_{IN} = 500μA
Ta = 75°C
25
– 30
OUTPUT CURRENT I_{OUT} (A)
OUTPUT SATURATION VOLTAGE $V_{CE\ (sat)}$ (V)

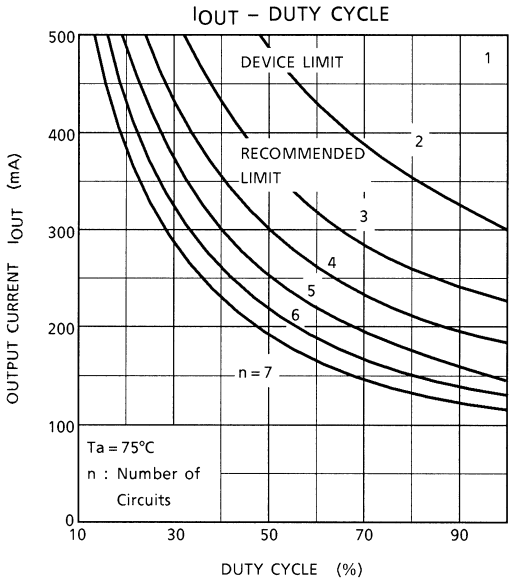

I_{IN} – V_{IN}
TD62103PG/FG
Ta = 25°C
I_{OUT} = 100mA, 200
300
INPUT CURRENT I_{IN} (mA)
INPUT VOLTAGE V_{IN} (V)

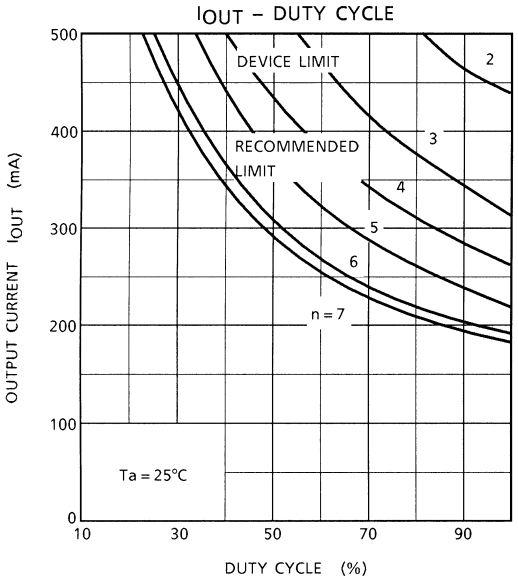

I_{IN} – V_{IN}
TD62105PG/FG
Ta = 25°C
I_{OUT} = 100mA
200
300
INPUT CURRENT I_{IN} (mA)
INPUT VOLTAGE V_{IN} (V)

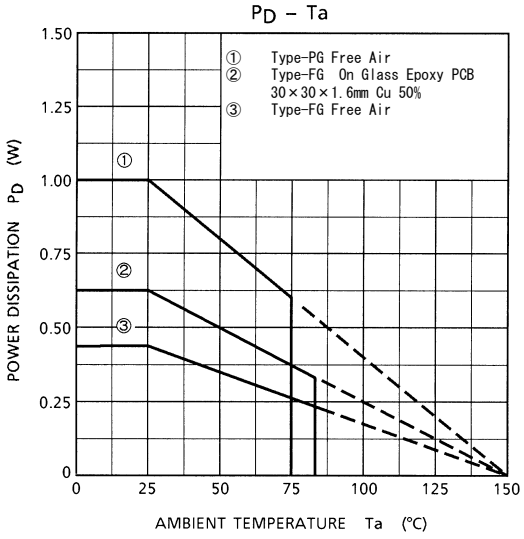

I_{IN} – V_{IN}
TD62101P / F
Ta = 25°C
I_{OUT}=100mA
200
300
INPUT CURRENT I_{IN} (mA)
INPUT VOLTAGE V_{IN} (V)


I_{IN} – V_{IN}
TD62104P / F
Ta = 25°C
I_C = 100mA
200
300
INPUT CURRENT I_{IN} (mA)
INPUT VOLTAGE V_{IN} (V)


I_{OUT} – I_{IN}
DEVICE LIMIT
RECOMMENDED LIMIT
Ta = 75°C
25
– 30
OUTPUT CURRENT I_{OUT} (mA)
INPUT CURRENT I_{IN} (μA)
0
100
200
300
400
500

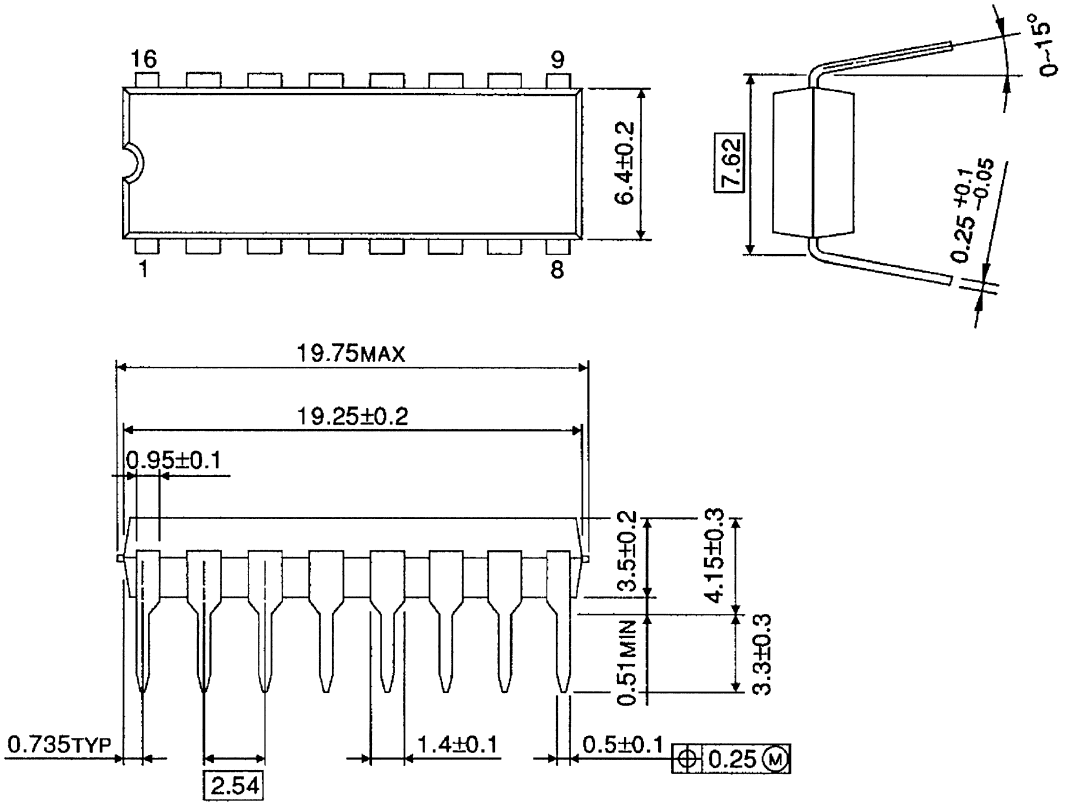

I_{OUT} – DUTY CYCLE
DEVICE LIMIT
RECOMMENDED LIMIT
1
2
3
4
5
6
n = 7
Ta = 75°C
n : Number of Circuits
OUTPUT CURRENT I_{OUT} (mA)
DUTY CYCLE (%)
10
30
50
70
90


I_{OUT} – DUTY CYCLE
DEVICE LIMIT
RECOMMENDED LIMIT
2
3
4
5
6
n = 7
Ta = 25°C
OUTPUT CURRENT I_{OUT} (mA)
DUTY CYCLE (%)
10
30
50
70
90


P_D – Ta
① Type-PG Free Air
② Type-FG On Glass Epoxy PCB 30×30×1.6mm Cu 50%
③ Type-FG Free Air
POWER DISSIPATION P_D (W)
AMBIENT TEMPERATURE Ta (°C)
0
0.25
0.50
0.75
1.00
1.25
1.50
25
50
75
100
125
150

PACKAGE DIMENSIONS

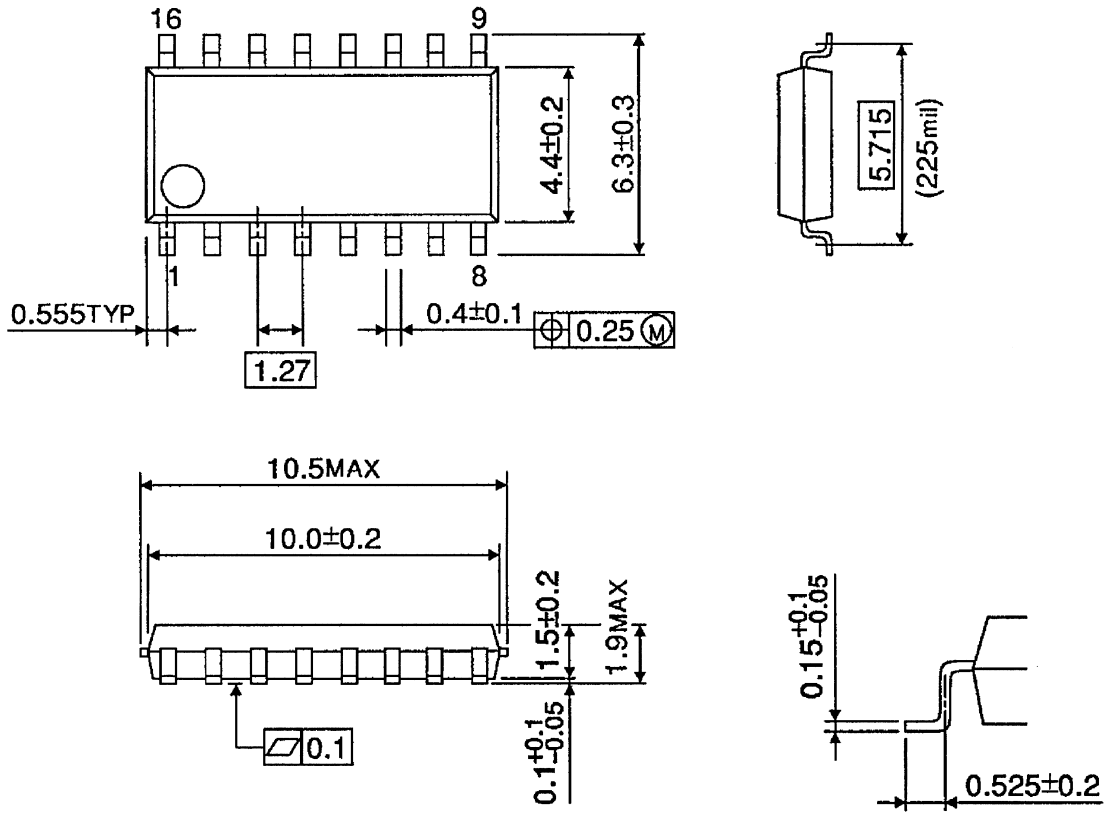
DIP16−P−300−2.54A Unit: mm



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

RESTRICTIONS ON PRODUCT USE

030619EBA

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