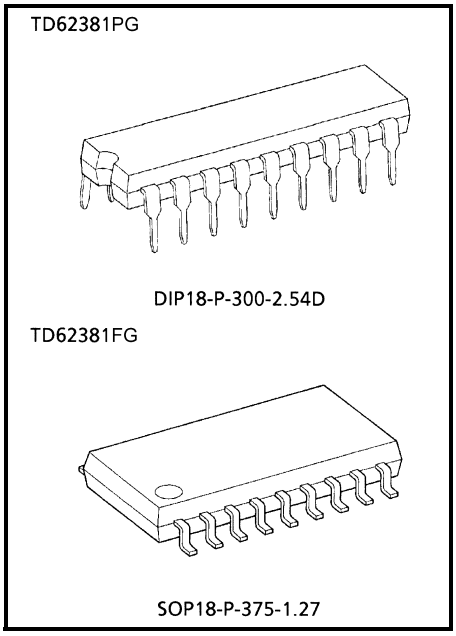
TOSHIBA BIPOLAR DIGITAL INTEGRATED CIRCUIT SILICON MONOLITHIC

TD62381PG,TD62381FG

8CH LOW SATURATION SINK DRIVER

The TD62381PG and TD62381FG are comprised of eight NPN low saturation drivers. These devices are specifically designed for multiplexed digit driving of eight digit common−cathode LED and also can be employed as a sink driver for multiplexed LED displays using with the TD62785P and TD62785F at standard supply voltage, 5 V.
Applications include relay, hammer, lamp and LED display drivers.
The suffix (G) appended to the part number represents a Lead (Pb)-Free product.

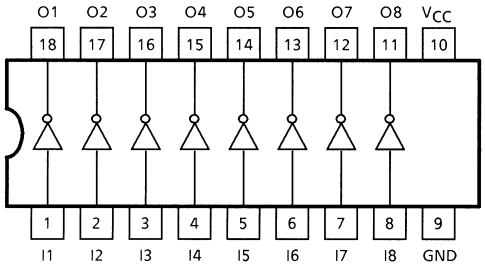


Weight
DIP18-P-300-2.54D: 1.47 g (Typ.)
SOP18-P-375-1.27 : 0.41 g (Typ.)

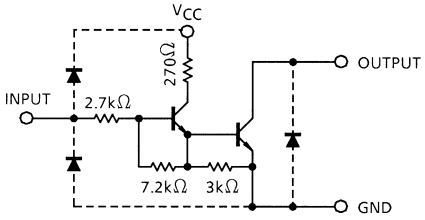
Features

- Low saturation output voltage: $V_{CE\ (sat)}$ = 0.9 V (Max.) @I_{out} = 500 mA
- Output rating 15 V (Min.) / 500 mA (Max.)
- Input compatible with TTL and 5 V CMOS
- Low level active inputs
- Standard supply voltage
- Package type−PG: DIP−18 pin
- Package type−FG: SOP−18 pin

Pin Connection (top view)



Schematics (each driver)



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

Absolute Maximum Ratings (Ta = 25°C)

CHARACTERISTIC		SYMBOL	RATING	UNIT
Supply Voltage		V_{CC}	7	V
Output Sustaining Voltage		$V_{CE\ (SUS)}$	15	V
Output Current		I_{OUT}	500	mA / ch
Input Voltage		V_{IN}	7	V
Input Current		I_{IN}	5	mA
Power Dissipation	PG	P_D (Note)	1.47	W
	FG		0.96	
Operating Temperature		T_{opr}	−40~85	°C
Storage Temperature		T_{stg}	−55~150	°C

Note: Delated above 25°C in the proportion of 11.7 mW / °C (PG-Type), 7.7 mW /°C (FG-Type).

Recommended Operating Conditions (Ta = −40~85°C)

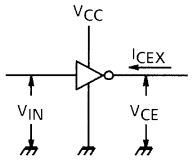
CHARACTERISTIC		SYMBOL	CONDITION		MIN	TYP.	MAX	UNIT
Supply Voltage		V_{CC}	—		4.5	5.0	5.5	V
Output Voltage		V_{OUT}	—		—	—	12	V
Output Current	PG	I_{OUT}	DC 1 Circuit, Ta = 25°C		0	—	400	mA / ch
	FG				0	—	400	
	PG		$T_{pw} \leq 25$ ms 8 Circuit On Ta = 85°C T_j = 120°C	Duty = 10%	0	—	400	
				Duty = 50%	0	—	350	
	FG			Duty = 10%	0	—	400	
				Duty = 50%	0	—	330	
Input Voltage		V_{IN}	—		0	—	V_{CC}	V
	Output On	$V_{IN\ (ON)}$	—		2.4	—	V_{CC}	
	Output Off	$V_{IN\ (OFF)}$	—		0	—	0.4	
Power Dissipation	PG	P_D	—		—	—	0.52	W
	FG		—		—	—	0.35	

Electrical Characteristics (Ta = 25°C, V_{CC} = 5 V)

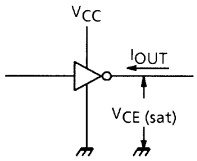
CHARACTERISTIC	SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN	TYP.	MAX	UNIT
Output Leakage Current	I_{CEX}	1	V_{IN} = OPEN V_{OUT} = 12 V, Ta = 85°C	—	—	100	μA
Output Saturation Voltage	$V_{CE\ (sat)}$	2	I_{OUT} = 500 mA	—	—	0.9	V
			I_{OUT} = 350 mA	—	—	0.7	
Input Current	$I_{IN\ (ON)}$	3	V_{CC} = 5 V, V_{IN} = 2.4 V	—	0.4	0.7	mA
Input Voltage (Output on)	$V_{IN\ (ON)}$	—	V_{CC} = 5 V	—	—	2.4	V
Supply Current	I_{CC}	4	V_{CC} = V_{IN} = 5 V	—	—	17	mA / ch
Turn-On Delay	t_{ON}	5	V_{OUT} = 10 V, R_L = 20 Ω C_L = 15 pF	—	0.1	—	μs
Turn-Off Delay	t_{OFF}			—	1.2	—	μs

Test Circuit

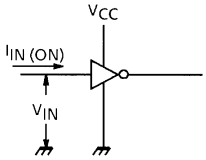
1. I_{CEX}



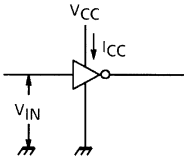
2. $V_{CE\ (sat)}$



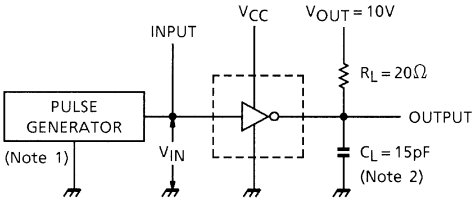
3. $I_{IN\ (ON)}$

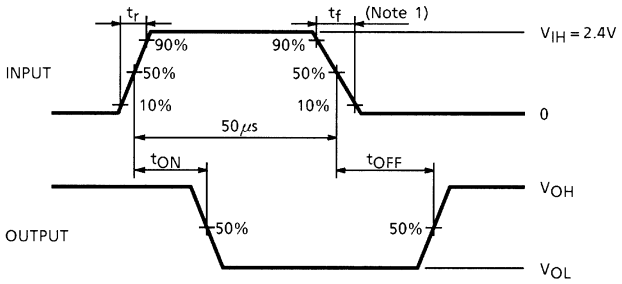


4. I_{CC}



5. t_{ON}, t_{OFF}





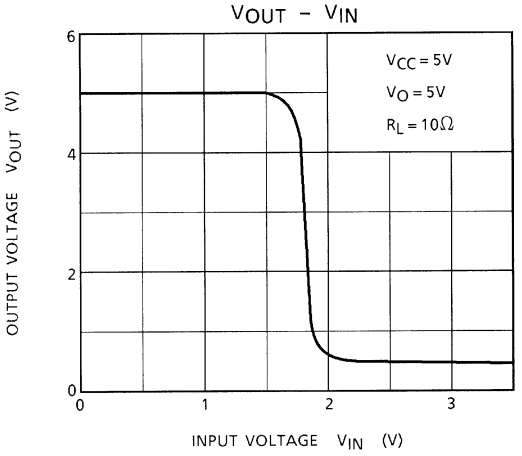
Note 1: Pulse Width 50 μs, Duty Cycle 10%
Output Impedance 50 Ω, $t_r \leq 5$ ns, $t_f \leq 10$ ns

Note 2: C_L includes probe and jig capacitance.

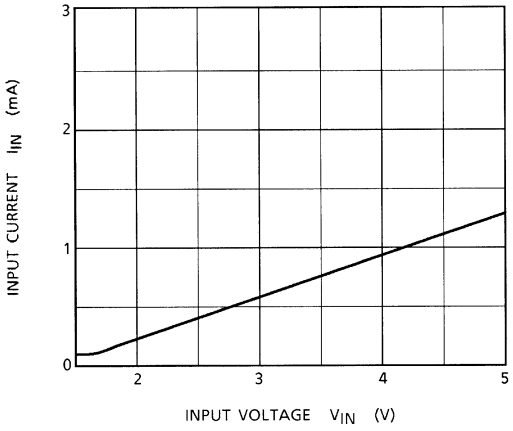
Precautions for Using

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, V_{CC}, and GND line since IC may be destroyed due to short−circuit between outputs, air contamination fault, or fault by improper grounding.

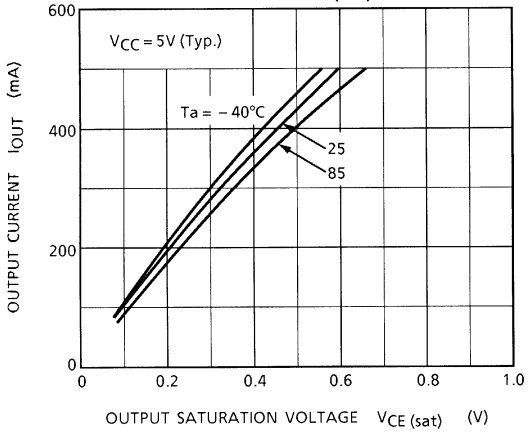
V_{OUT} – V_{IN}



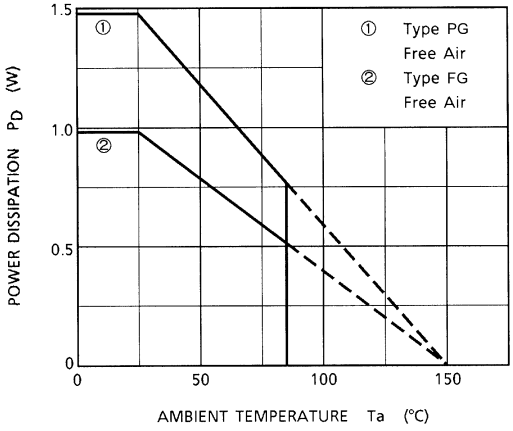
I_{IN} – V_{IN}



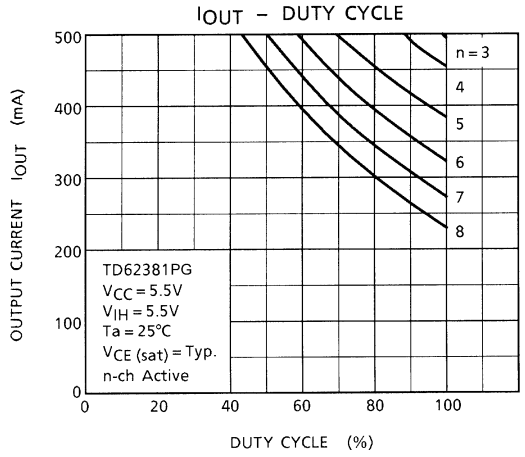
I_{OUT} – $V_{CE\ (sat)}$



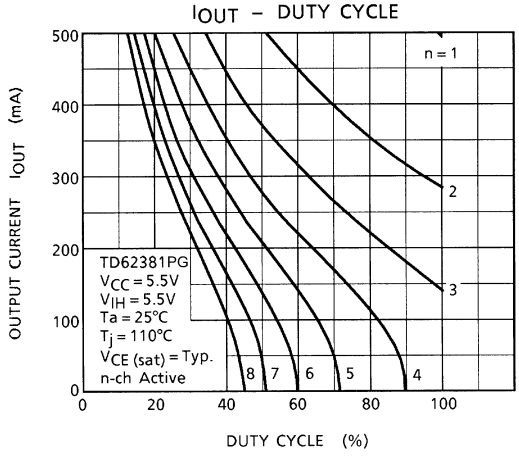
P_D – Ta

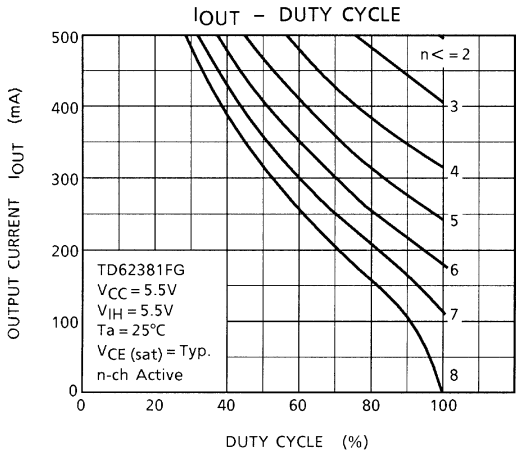


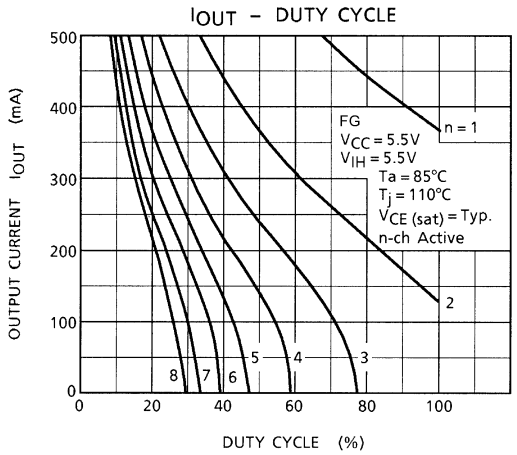
I_{OUT} – DUTY CYCLE



I_{OUT} – DUTY CYCLE

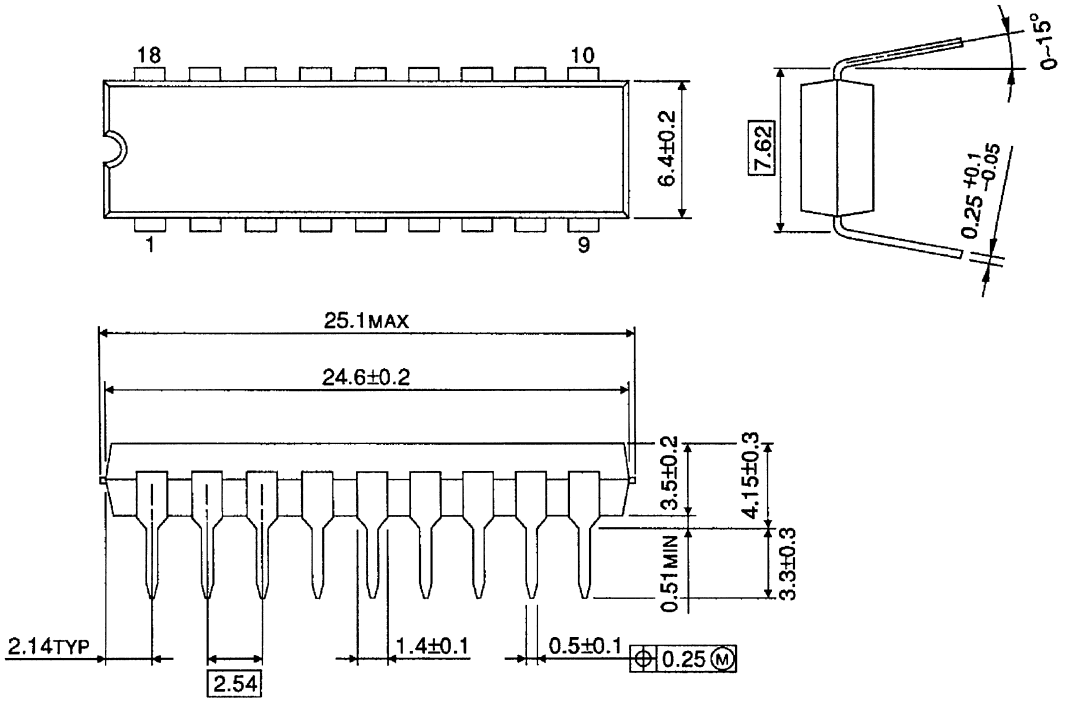



IOUT – DUTY CYCLE
OUTPUT CURRENT IOUT (mA)
DUTY CYCLE (%)
n < = 2
3
4
5
6
7
8
TD62381FG
VCC = 5.5V
VIH = 5.5V
Ta = 25°C
VCE (sat) = Typ.
n-ch Active
0
100
200
300
400
500
0
20
40
60
80
100


IOUT – DUTY CYCLE
OUTPUT CURRENT IOUT (mA)
DUTY CYCLE (%)
FG
VCC = 5.5V
VIH = 5.5V
Ta = 85°C
Tj = 110°C
VCE (sat) = Typ.
n-ch Active
n = 1
2
3
4
5
6
7
8
0
100
200
300
400
500
0
20
40
60
80
100

Package Dimensions

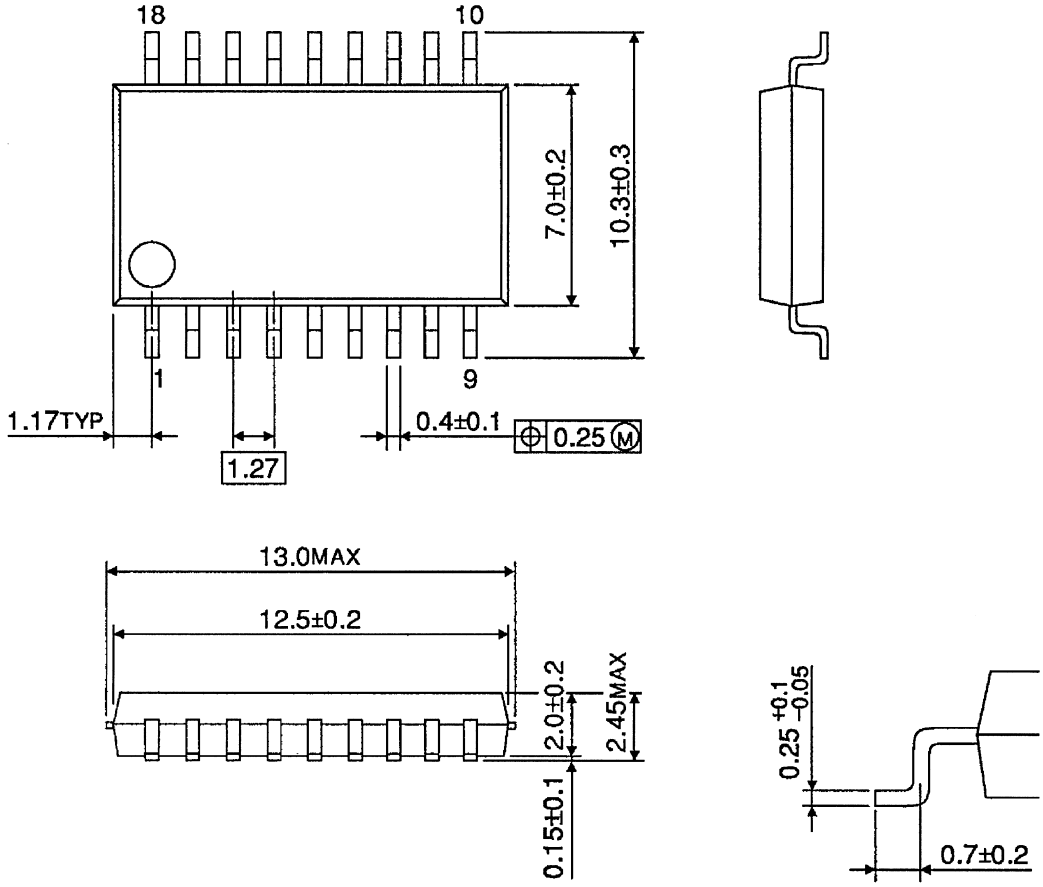
DIP18-P-300-2.54D Unit: mm



Weight: 1.47 g (Typ.)

Package Dimensions

SOP18-P-375-1.27 Unit: mm



Weight: 0.41 g (Typ.)

Notes on Contents

1. Schematics

The schematics may be simplified or some parts of them may be omitted for explanatory purposes.

2. Absolute Maximum Ratings

The absolute maximum ratings of a semiconductor device are a set of specified parameter values that must not be exceeded during operation, even for an instant.
If any of these ratings are exceeded during operation, the electrical characteristics of the device may be irreparably altered and the reliability and lifetime of the device can no longer be guaranteed.
Moreover, any exceeding of the ratings during operation may cause breakdown, damage and/or degradation in other equipment. Applications using the device should be designed so that no absolute maximum rating will ever be exceeded under any operating conditions.
Before using, creating and/or producing designs, refer to and comply with the precautions and conditions set forth in this document.

3. Recommended Operating Conditions

The values of the conditions are applied within the range of the operating temperature and not guaranteed.

4. AC Characteristics

AC characteristics that mean turn-on and turn-off time are targeted design values and not guaranteed.

5. Application Circuits

The application circuits shown in this document are provided for reference purposes only. Thorough evaluation is required, especially in the phase of mass production design.
In furnishing these examples of application circuits, Toshiba does not grant the use of any industrial property rights.

6. Graphics Characteristics

Graphics characteristics are reference ones and not guaranteed.

Handling of the IC

Ensure that the product is installed correctly to prevent breakdown, damage and/or degradation in the product or equipment.

About solderability, following conditions were confirmed

- Solderability

  (1) Use of Sn-37Pb 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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060116EBA

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