TOSHIBA Bipolar Digital Integrated Circuit Silicon Monolithic

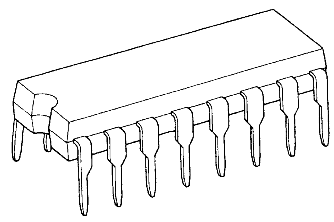
TD62502PG,TD62502FG,TD62503PG,TD62503FG

7ch Single Driver: Common Emitter

The TD62502PG/FG and TD62503PG/FG Series are comprised of seven NPN transistor arrays.

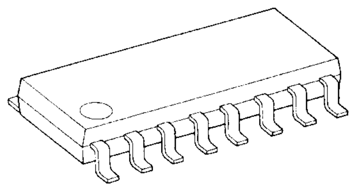
Applications include relay, hammer, lamp and display (LED) drivers.

TD62502PG, TD62503PG



DIP16-P-300-2.54A

TD62502FG, TD62503FG



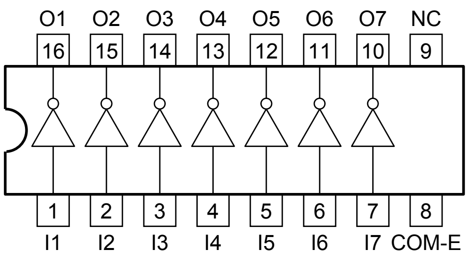
SOP16-P-225-1.27

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

Features

- Output current (single output) 200 mA (max)
- High sustaining voltage output 35 V (min)
- Inputs compatible with various types of logic.
- TD62502PG/FG
  : R_{IN} = 10.5 kΩ + 7 V Zener Diode ··· 14 to 25 V P-MOS
- TD62503PG/FG
  : R_{IN} = 2.7 kΩ ··· TTL, 5 V C-MOS
- Package Type-PG: DIP-16 pin
- Package Type-FG: SOP-16 pin

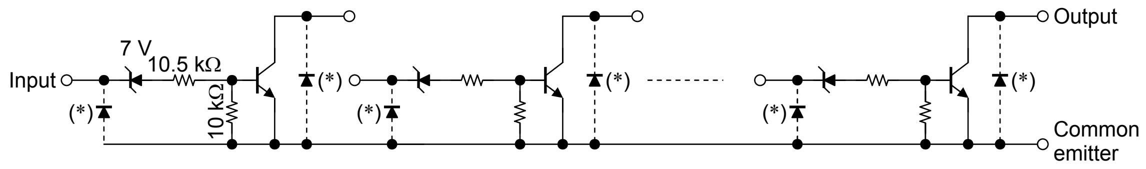
Pin Assignment (top view)



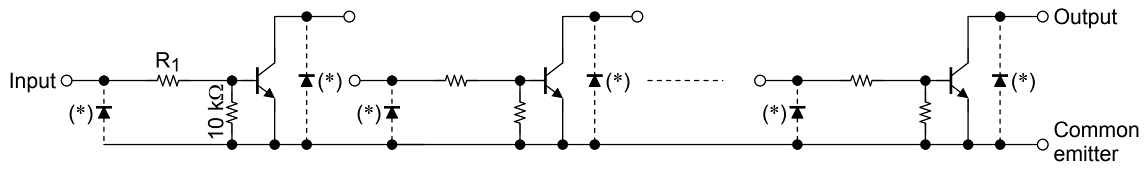
Note: NC pin assignment
The NC pin is not assigned to an internal chip of these products; hence, no need to assign necessarily. If it is needed, Toshiba recommends that you connect the NC pin to the common emitter (GND).

Schematics (each driver)

TD62502PG/FG



TD62503PG/FG



R_1 = 2.7 kΩ

∗: Parasitic diodes

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

Absolute Maximum Ratings (Ta = 25°C)

Characteristics		Symbol	Rating	Unit
Collector-emitter voltage		V_{CEO}	35	V
Collector-base voltage		V_{CBO}	50	V
Collector current		I_C	200	mA/ch
Input voltage		V_{IN}	−0.5 to 30	V
Power dissipation	PG	P_D	1.0	W
	FG		0.625 (Note)	
Operating temperature		T_{opr}	−40 to 85	°C
Storage temperature		T_{stg}	−55 to 150	°C

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

Operating Ranges (Ta = −40 to 85°C)

Characteristics		Symbol	Condition	Min	Typ.	Max	Unit
Collector-emitter voltage		V_{CEO}	—	0	—	35	V
Collector-base voltage		V_{CBO}	—	0	—	50	V
Collector current		I_C	—	0	—	150	mA/ch
Input voltage (Output on)	TD62502PG/FG	$V_{IN\ (ON)}$	I_{IN} = 1 mA, I_C = 10 mA	14.0	—	25	V
	TD62503PG/FG			2.4	—	25	
Input voltage (Output off)	TD62502PG/FG	$V_{IN\ (OFF)}$	I_C ≤ 10 μA	0	—	7.0	V
	TD62503PG/FG			0	—	0.4	
Power dissipation	PG	P_D	—	—	—	0.360	W
	FG		(Note)	—	—	0.325	

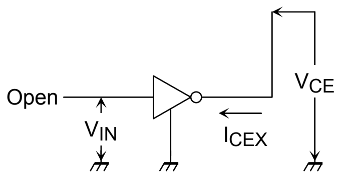
Note: On Glass Epoxy PCB (30 × 30 × 1.6 mm Cu 50%)

Electrical Characteristics (Ta = 25°C)

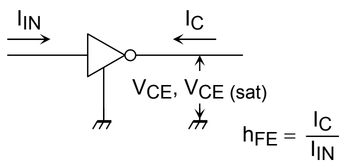
Characteristics		Symbol	Test Circuit	Test Condition	Min	Typ.	Max	Unit
Output leakage current		I_{CEX}	1	V_{CE} = 25V, V_{IN} = 0 V	—	—	10	μA
Collector-emitter saturation voltage		$V_{CE\ (sat)}$	2	I_{IN} = 1 mA, I_C = 10 mA	—	—	0.2	V
				I_{IN} = 3 mA, I_C = 150 mA	—	—	0.8	
DC current transfer ratio		h_{FE}	2	V_{CE} = 10 V, I_C = 10 mA	50	—	—	—
Input voltage (Output on)	TD62502PG/FG	$V_{IN\ (ON)}$	3	I_{IN} = 1 mA, I_C = 10 mA	13	17	23	V
	TD62503PG/FG				2.4	3.4	4.2	
Turn-ON delay		t_{ON}	4	V_{OUT} = 35 V, R_L = 3.3k Ω, C_L = 15 pF	—	50	—	ns
Turn-OFF delay		t_{OFF}			—	200	—	

Test Circuit

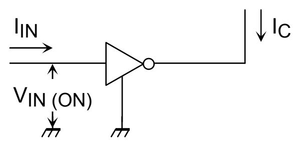
1. I_{CEX}



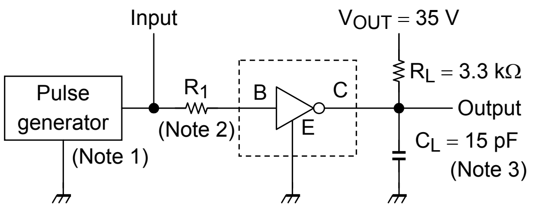
2. h_{FE}, $V_{CE\ (sat)}$

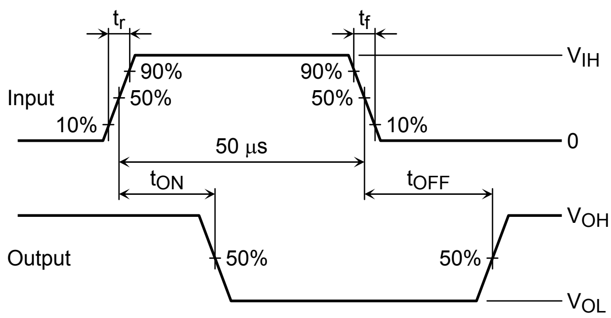


3. $V_{IN\ (ON)}$



4. t_{ON}, t_{OFF}





Note 1: Pulse width 50 μs, Duty cycle 10%
Output impedance 50 Ω, tr ≤ 5 ns, tf ≤ 10 ns

Note 2: Input Condition

Type Number	V_{IH}
TD62502PG/FG	15 V
TD62503PG/FG	3 V

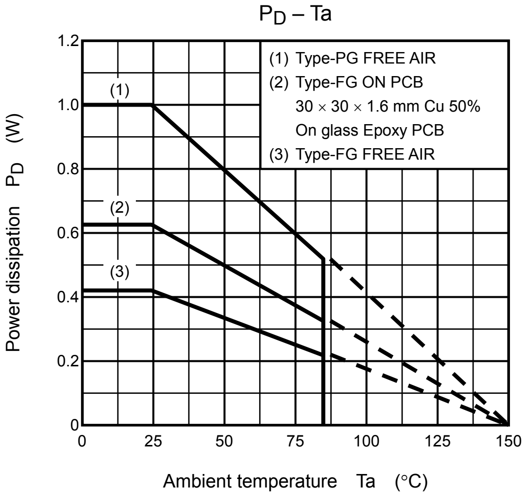
Note 3: C_L includes probe and jig capacitance

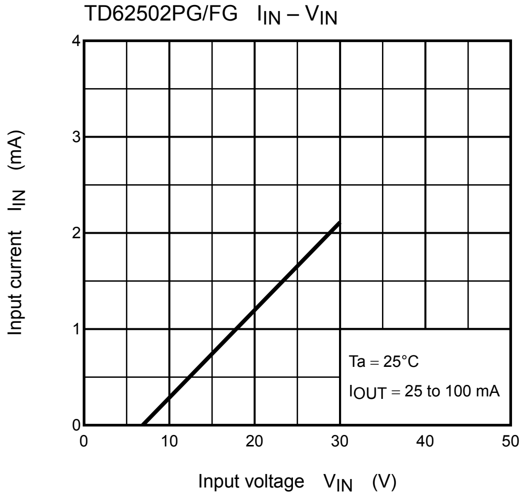
Precautions for Using

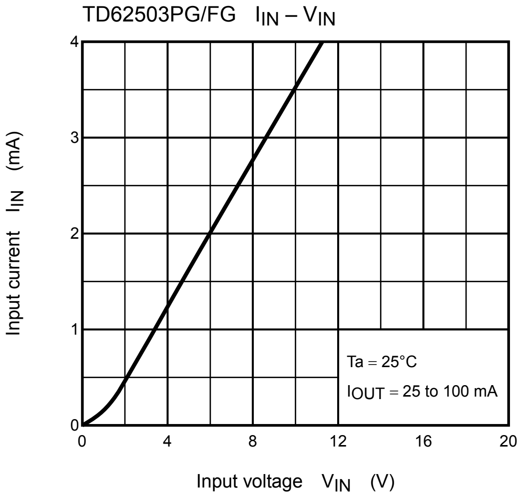
This IC does not integrate protection circuits such as overcurrent and overvoltage protectors.

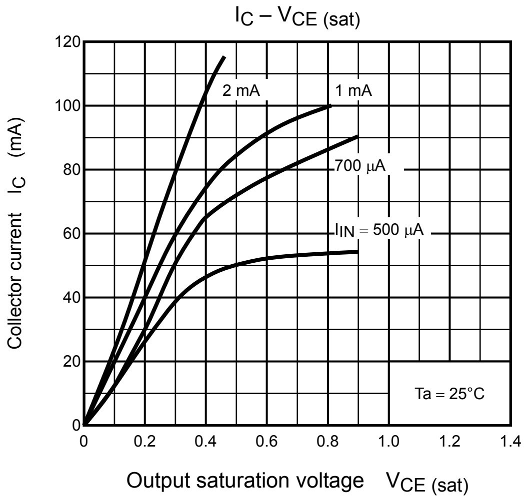
Thus, if excess current or voltage is applied to the IC, the IC may be damaged. Please design the IC so that excess current or voltage will not be applied to the IC.

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.


PD – Ta
(1) Type-PG FREE AIR
(2) Type-FG ON PCB
30 × 30 × 1.6 mm Cu 50%
On glass Epoxy PCB
(3) Type-FG FREE AIR
Power dissipation PD (W)
Ambient temperature Ta (°C)
0 25 50 75 100 125 150
0 0.2 0.4 0.6 0.8 1.0 1.2

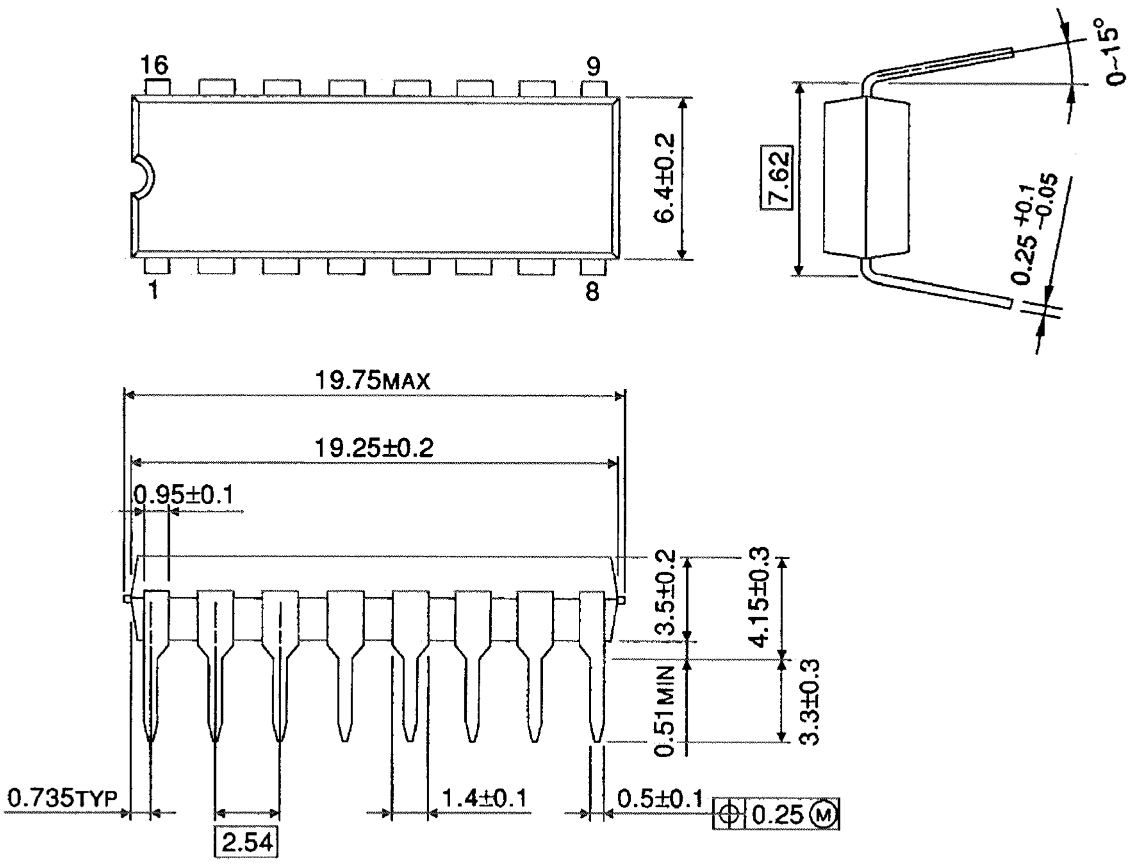

TD62502PG/FG IIN – VIN
Input current IIN (mA)
Input voltage VIN (V)
Ta = 25°C
IOUT = 25 to 100 mA
0 10 20 30 40 50
0 1 2 3 4


TD62503PG/FG IIN – VIN
Input current IIN (mA)
Input voltage VIN (V)
Ta = 25°C
IOUT = 25 to 100 mA
0 4 8 12 16 20
0 1 2 3 4


IC – VCE (sat)
Collector current IC (mA)
Output saturation voltage VCE (sat)
2 mA
1 mA
700 μA
IIN = 500 μA
Ta = 25°C
0 0.2 0.4 0.6 0.8 1.0 1.2 1.4
0 20 40 60 80 100 120

Package Dimensions

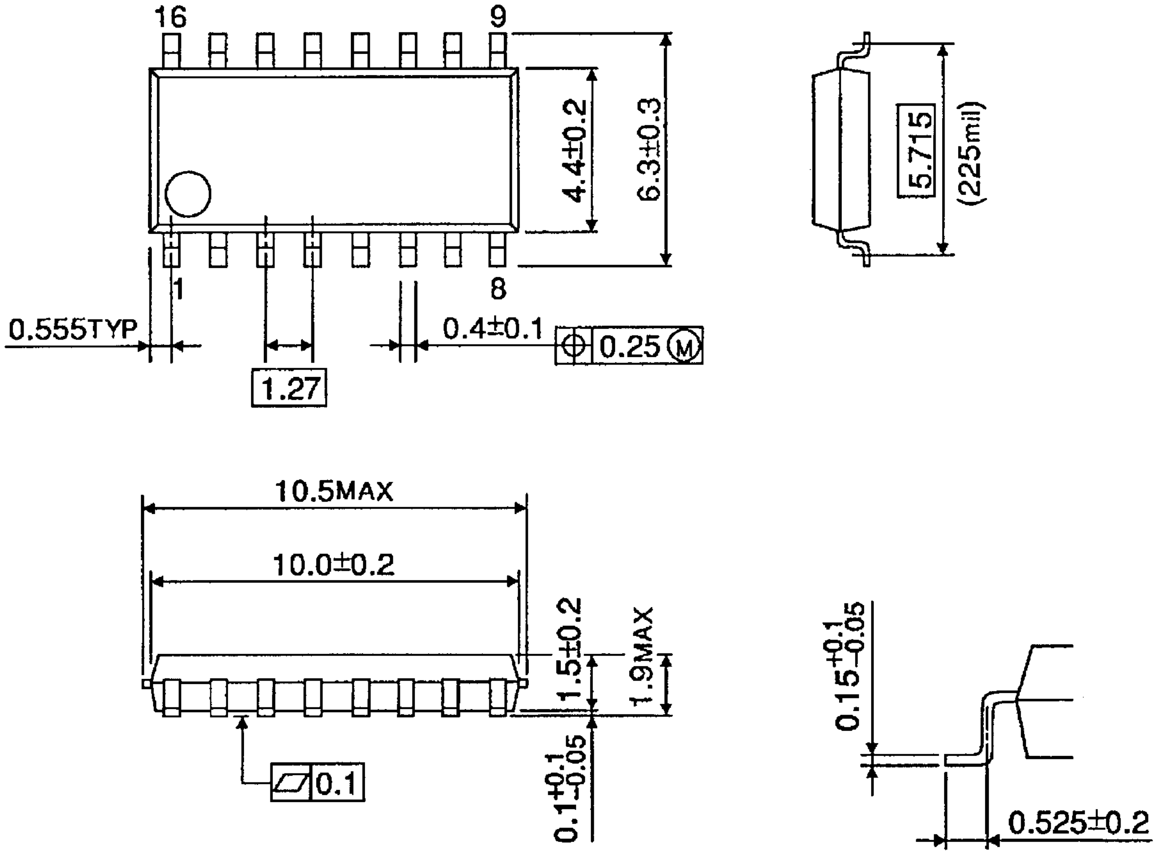
DIP16-P-300-2.54A Unit : mm



Weight: 1.11 g (typ.)

Package Dimensions

SOP16-P-225-1.27 Unit : mm



Weight: 0.16 g (typ.)

Notes on Contents

1. Equivalent Circuits

The equivalent circuit diagrams may be simplified or some parts of them may be omitted for explanatory purposes.

2. Test Circuits

Components in the test circuits are used only to obtain and confirm the device characteristics. These components and circuits are not guaranteed to prevent malfunction or failure from occurring in the application equipment.

IC Usage Considerations

Notes on Handling of ICs

(1) The absolute maximum ratings of a semiconductor device are a set of ratings that must not be exceeded, even for a moment. Do not exceed any of these ratings.
Exceeding the rating(s) may cause the device breakdown, damage or deterioration, and may result injury by explosion or combustion.

(2) Use an appropriate power supply fuse to ensure that a large current does not continuously flow in case of over current and/or IC failure. The IC will fully break down when used under conditions that exceed its absolute maximum ratings, when the wiring is routed improperly or when an abnormal pulse noise occurs from the wiring or load, causing a large current to continuously flow and the breakdown can lead smoke or ignition. To minimize the effects of the flow of a large current in case of breakdown, appropriate settings, such as fuse capacity, fusing time and insertion circuit location, are required.

(3) If your design includes an inductive load such as a motor coil, incorporate a protection circuit into the design to prevent device malfunction or breakdown caused by the current resulting from the inrush current at power ON or the negative current resulting from the back electromotive force at power OFF. IC breakdown may cause injury, smoke or ignition.
Use a stable power supply with ICs with built-in protection functions. If the power supply is unstable, the protection function may not operate, causing IC breakdown. IC breakdown may cause injury, smoke or ignition.

(4) Do not insert devices in the wrong orientation or incorrectly.
Make sure that the positive and negative terminals of power supplies are connected properly.
Otherwise, the current or power consumption may exceed the absolute maximum rating, and exceeding the rating(s) may cause the device breakdown, damage or deterioration, and may result injury by explosion or combustion.
In addition, do not use any device that is applied the current with inserting in the wrong orientation or incorrectly even just one time.

(5) Carefully select external components (such as inputs and negative feedback capacitors) and load components (such as speakers), for example, power amp and regulator.
If there is a large amount of leakage current such as input or negative feedback condenser, the IC output DC voltage will increase. If this output voltage is connected to a speaker with low input withstand voltage, overcurrent or IC failure can cause smoke or ignition. (The over current can cause smoke or ignition from the IC itself.) In particular, please pay attention when using a Bridge Tied Load (BTL) connection type IC that inputs output DC voltage to a speaker directly.

Points to Remember on Handling of ICs

(1) Heat Radiation Design
In using an IC with large current flow such as power amp, regulator or driver, please design the device so that heat is appropriately radiated, not to exceed the specified junction temperature (Tj) at any time and condition. These ICs generate heat even during normal use. An inadequate IC heat radiation design can lead to decrease in IC life, deterioration of IC characteristics or IC breakdown. In addition, please design the device taking into considerate the effect of IC heat radiation with peripheral components.

(2) Back-EMF
When a motor rotates in the reverse direction, stops or slows down abruptly, a current flow back to the motor's power supply due to the effect of back-EMF. If the current sink capability of the power supply is small, the device's motor power supply and output pins might be exposed to conditions beyond absolute maximum ratings. To avoid this problem, take the effect of back-EMF into consideration in system design.

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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