

TOSHIBA Bipolar Digital Integrated Circuit  
Silicon Monolithic

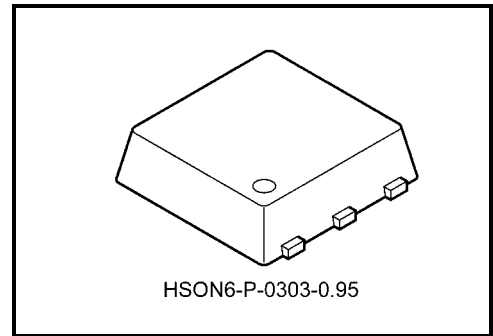
# TD62S312AFM

## 1-Channel Darlington Source-Current Driver

TD62S312AFM is a 1-channel noninverting source-current driver. The driver incorporates output clamp diodes used to clamp the counter electromotive force which is generated when driving an inductive load, and an input resistor which limits base current. The driver is optimal for driving relays and LEDs. When using the driver, pay attention to the thermal conditions.

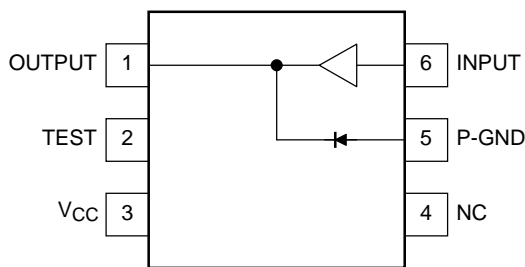
### Features

- Ultra-small HSON6 package with heat sink on rear
- Large output voltage:  $V_{OUT} = -50\text{ V (min)}$
- Large output current:  $I_{OUT} = -100\text{ mA (max)}$
- Built-in input resistor:  $R_{IN} = 10\text{ k}\Omega$
- Input signal: High Level Active
- Built-in output clamp diodes

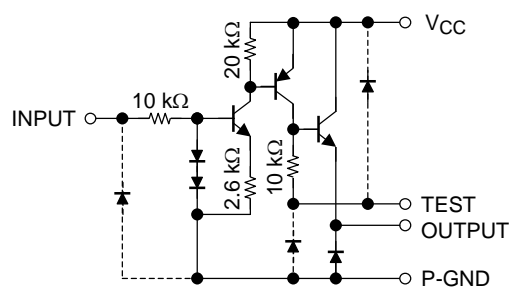


Weight: 0.017 g (typ.)

### Pin Connection (top view)



### Basic Circuit Diagram



Note 1: Diodes shown using dotted lines are parasitic. Do not use them.

Note 2: When using the driver, connect the OUTPUT pin to the TEST pin.

Note 3: When using the driver, connect the P-GND pin to the heat sink on the rear of the package.

## Maximum Ratings (Ta = 25°C)

Characteristics	Symbol	Rating	Unit
Supply voltage	V <sub>CC</sub>	-0.5~50	V
Output voltage	V <sub>OUT</sub>	-50	V
Collector-emitter voltage	V <sub>CEO</sub>	50	V
Output current	I <sub>OUT</sub>	-100	mA
Input voltage	V <sub>IN</sub>	-0.5~50	V
Clamp diode reverse voltage	V <sub>R</sub>	50	V
Clamp diode forward current	I <sub>F</sub>	100	mA
Power dissipation	P <sub>D</sub> (Note 4)	0.78	W
Saturated thermal resistance	R <sub>th(j-a)</sub> (Note 4)	160	°C/W
	R <sub>th(j-c)</sub> (Note 5)	25	
Operating temperature	T <sub>opr</sub>	-40~85	°C
Storage temperature	T <sub>stg</sub>	-55~150	°C

Note 4: 114.3 × 76.2 × 1.6 mm glass epoxy film substrate Cu heat dissipation pattern 100 mm<sup>2</sup>

Note 5: When an infinite heat sink is mounted.

## Recommended Operating Condition (Ta = -40~85°C)

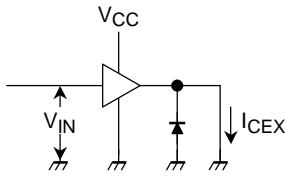
Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Supply voltage		V <sub>CC</sub>	—	—	—	50	V
Output current		I <sub>OUT</sub>	Ta = 60°C, T <sub>j</sub> = 105°C	—	—	-100	mA
Input voltage		V <sub>IN</sub>	—	—	—	12	V
Input voltage	Output ON	V <sub>IN(ON)</sub>	—	2.0	5.0	12	V
	Output OFF	V <sub>IN(OFF)</sub>	—	0	—	0.8	
Clamp diode reverse voltage		V <sub>R</sub>	—	—	—	50	V
Clamp diode forward current		I <sub>F</sub>	—	—	—	100	mA

## Electrical Characteristics (Ta = 25°C, V<sub>CC</sub> = 50 V)

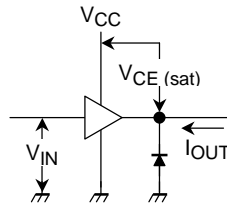
Characteristics		Symbol	Test Circuit	Test Condition	Min	Typ.	Max	Unit
Output leakage current		I <sub>CEX</sub>	1	V <sub>IN</sub> = 0.4 V	—	—	10	μA
Output saturation voltage		V <sub>CE(sat)</sub>	2	V <sub>IN</sub> = 2.0 V, I <sub>OUT</sub> = -70 mA	—	—	1.3	V
				V <sub>IN</sub> = 2.0 V, I <sub>OUT</sub> = -50 mA	—	—	1.1	
Input current		I <sub>IN(ON)</sub>	3	V <sub>IN</sub> = 3.6 V	—	240	350	μA
				V <sub>IN</sub> = 12 V	—	1.1	1.6	
Input voltage		V <sub>IN(ON)</sub>	4	V <sub>CE</sub> = 2.0 V, I <sub>OUT</sub> = -70 mA	—	—	2.0	V
		V <sub>IN(OFF)</sub>		I <sub>OUT</sub> = -500 μA	0.5	—	—	
Power dissipation		I <sub>CC(ON)</sub>	3	V <sub>IN</sub> = 5 V	—	—	0.6	mA
Clamp diode leakage current		I <sub>R</sub>	5	V <sub>R</sub> = 50 V	—	—	10	μA
Clamp diode forward voltage		V <sub>F</sub>	6	I <sub>F</sub> = 100mA	—	—	1.3	V
Turn-on delay		t <sub>ON</sub>	7	R <sub>L</sub> = 625 Ω, C <sub>L</sub> = 15 pF	—	0.2	—	μs
Turn-off delay		t <sub>OFF</sub>			—	2.0	—	

**Test Circuit**

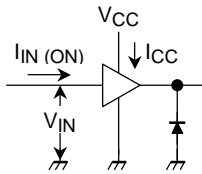
**1.  $I_{CEX}$**



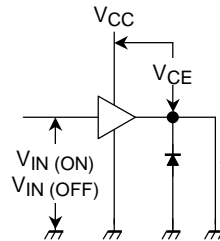
**2.  $V_{CE(sat)}$**



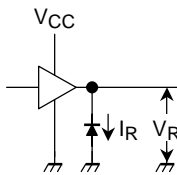
**3.  $I_{IN(ON)}$ ,  $I_{CC}$**



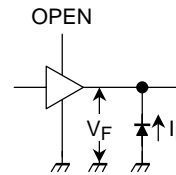
**4.  $V_{IN(ON)}$ ,  $V_{IN(OFF)}$**



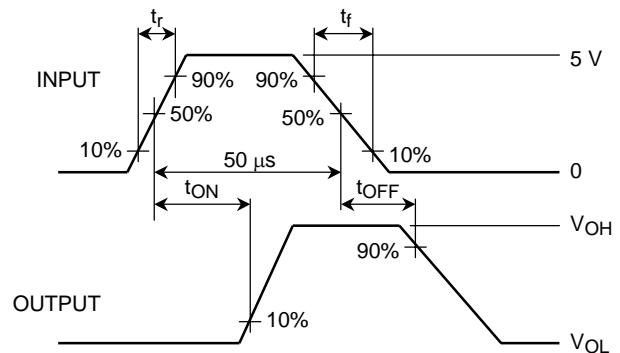
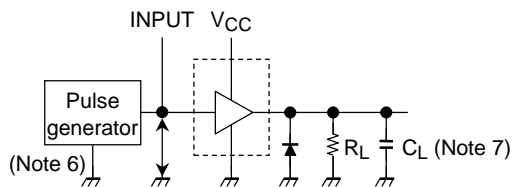
**5.  $I_R$**



**6.  $V_F$**



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



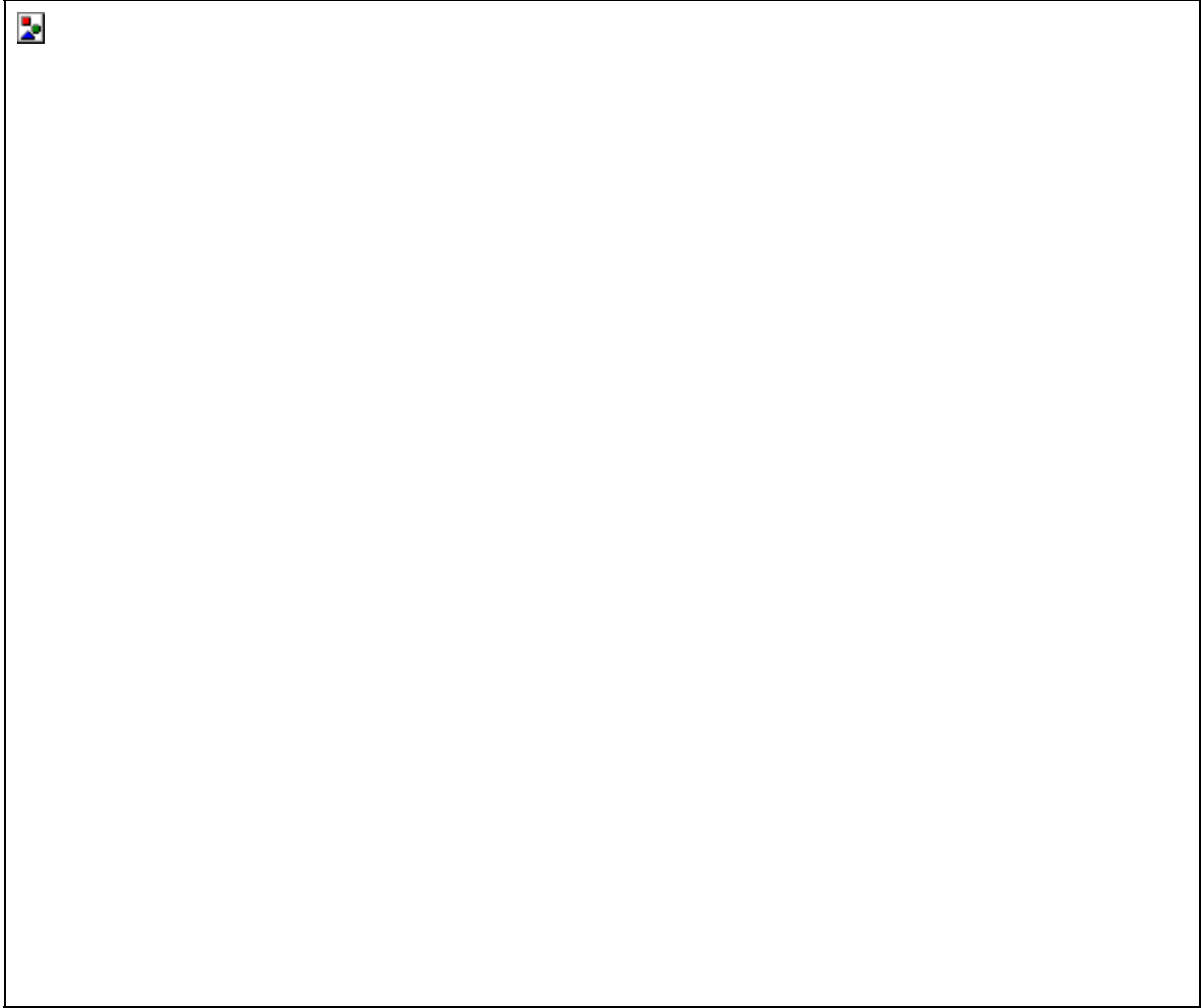
Note 6: Pulse width 50  $\mu$ s, duty cycle 10%  
Output impedance 50  $\Omega$ ,  $t_r \leq 5$  ns,  $t_f \leq 10$  ns

Note 7:  $C_L$  includes probe and jig capacitance.

**Caution on Application**

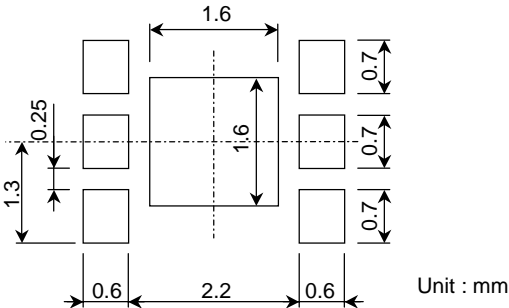
1. The device does not include protectors such as an overcurrent protector and an overvoltage protector. Applying excessive current or voltage may damage the device. Thus, design with great care to prevent excessive current or voltage from being applied to the device. The device may also be damaged by short-circuits between outputs and power supply/ground. Take care when designing output, VCC and GND line.
2. Be sure to mount the device in the correct orientation. Make sure that the positive and negative power supply pins are connected the right way round. Otherwise, the absolute maximum current and power dissipation ratings may be exceeded and the device may break down or undergo performance degradation, causing it to catch fire or explode, and resulting in injury.

**Package Dimensions**

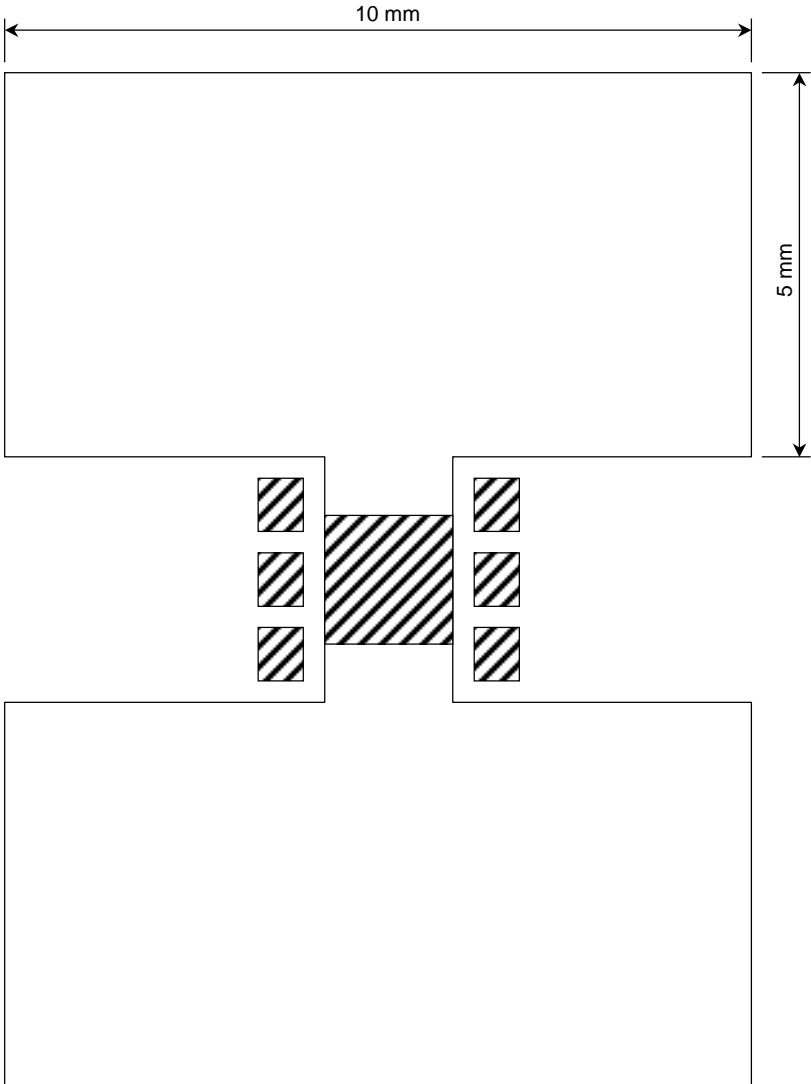


Weight: 0.017 g (typ.)

**Preliminary land pattern**



**Preliminary PCB trace dimension**



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