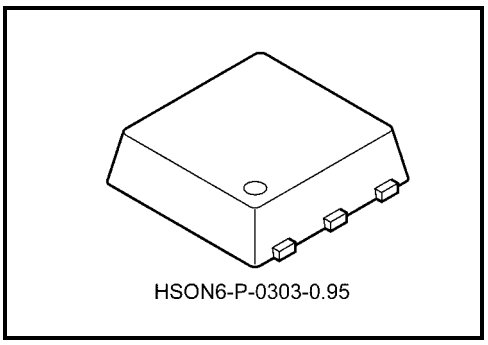
TOSHIBA Bipolar Digital Integrated Circuit
Silicon Monolithic

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.

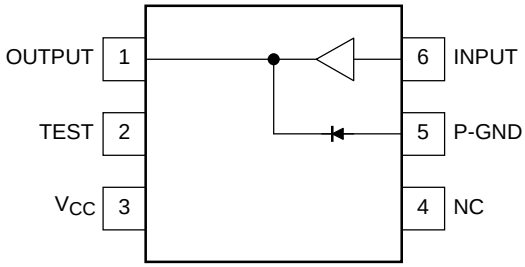


Weight: 0.017 g (typ.)

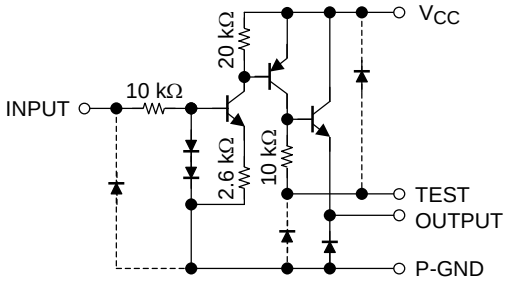
Features

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

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_{CC}	−0.5~50	V
Output voltage	V_{OUT}	−50	V
Collector-emitter voltage	V_{CEO}	50	V
Output current	I_{OUT}	−100	mA
Input voltage	V_{IN}	−0.5~50	V
Clamp diode reverse voltage	V_R	50	V
Clamp diode forward current	I_F	100	mA
Power dissipation	P_D (Note 4)	0.78	W
Saturated thermal resistance	$R_{th\ (j\text{-}a)}$ (Note 4)	160	°C/W
	$R_{th\ (j\text{-}c)}$ (Note 5)	25	
Operating temperature	T_{opr}	−40~85	°C
Storage temperature	T_{stg}	−55~150	°C

Note 4: 114.3 × 76.2 × 1.6 mm glass epoxy film substrate Cu heat dissipation pattern 100 mm^2

Note 5: When an infinite heat sink is mounted.

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

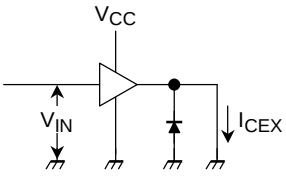
Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Supply voltage		V_{CC}	—	—	—	50	V
Output current		I_{OUT}	Ta = 60°C, T_j = 105°C	—	—	−100	mA
Input voltage		V_{IN}	—	—	—	12	V
Input voltage	Output ON	$V_{IN\ (ON)}$	—	2.0	5.0	12	V
	Output OFF	$V_{IN\ (OFF)}$	—	0	—	0.8	
Clamp diode reverse voltage		V_R	—	—	—	50	V
Clamp diode forward current		I_F	—	—	—	100	mA

Electrical Characteristics (Ta = 25°C, V_{CC} = 50 V)

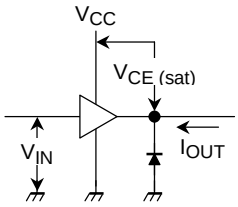
Characteristics	Symbol	Test Circuit	Test Condition	Min	Typ.	Max	Unit
Output leakage current	I_{CEX}	1	V_{IN} = 0.4 V	—	—	10	μA
Output saturation voltage	$V_{CE\ (sat)}$	2	V_{IN} = 2.0 V, I_{OUT} = −70 mA	—	—	1.3	V
			V_{IN} = 2.0 V, I_{OUT} = −50 mA	—	—	1.1	
Input current	$I_{IN\ (ON)}$	3	V_{IN} = 3.6 V	—	240	350	μA
			V_{IN} = 12 V	—	1.1	1.6	mA
Input voltage	$V_{IN\ (ON)}$	4	V_{CE} = 2.0 V, I_{OUT} = −70 mA	—	—	2.0	V
	$V_{IN\ (OFF)}$		I_{OUT} = −500 μA	0.5	—	—	
Power dissipation	$I_{CC\ (ON)}$	3	V_{IN} = 5 V	—	—	0.6	mA
Clamp diode leakage current	I_R	5	V_R = 50 V	—	—	10	μA
Clamp diode forward voltage	V_F	6	I_F = 100mA	—	—	1.3	V
Turn-on delay	t_{ON}	7	R_L = 625 Ω, C_L = 15 pF	—	0.2	—	μs
Turn-off delay	t_{OFF}			—	2.0	—	

Test Circuit

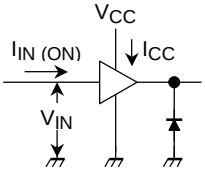
1. I_{CEX}



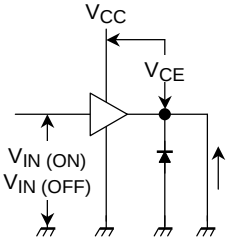
2. $V_{CE\ (sat)}$



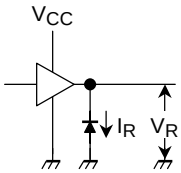
3. $I_{IN\ (ON)}$, I_{CC}



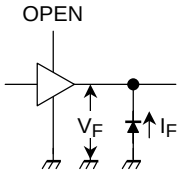
4. $V_{IN\ (ON)}$, $V_{IN\ (OFF)}$



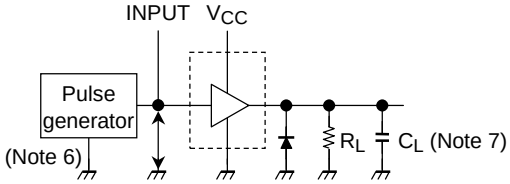
5. I_R

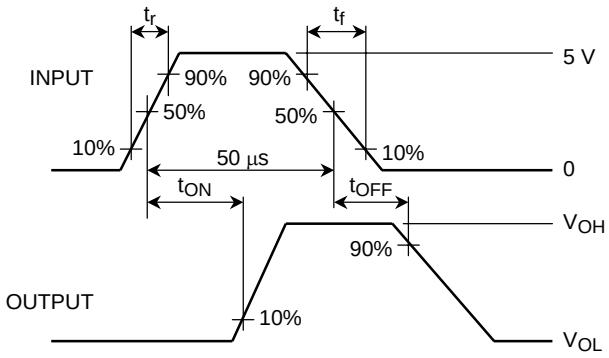


6. V_F



7. t_{ON}, t_{OFF}





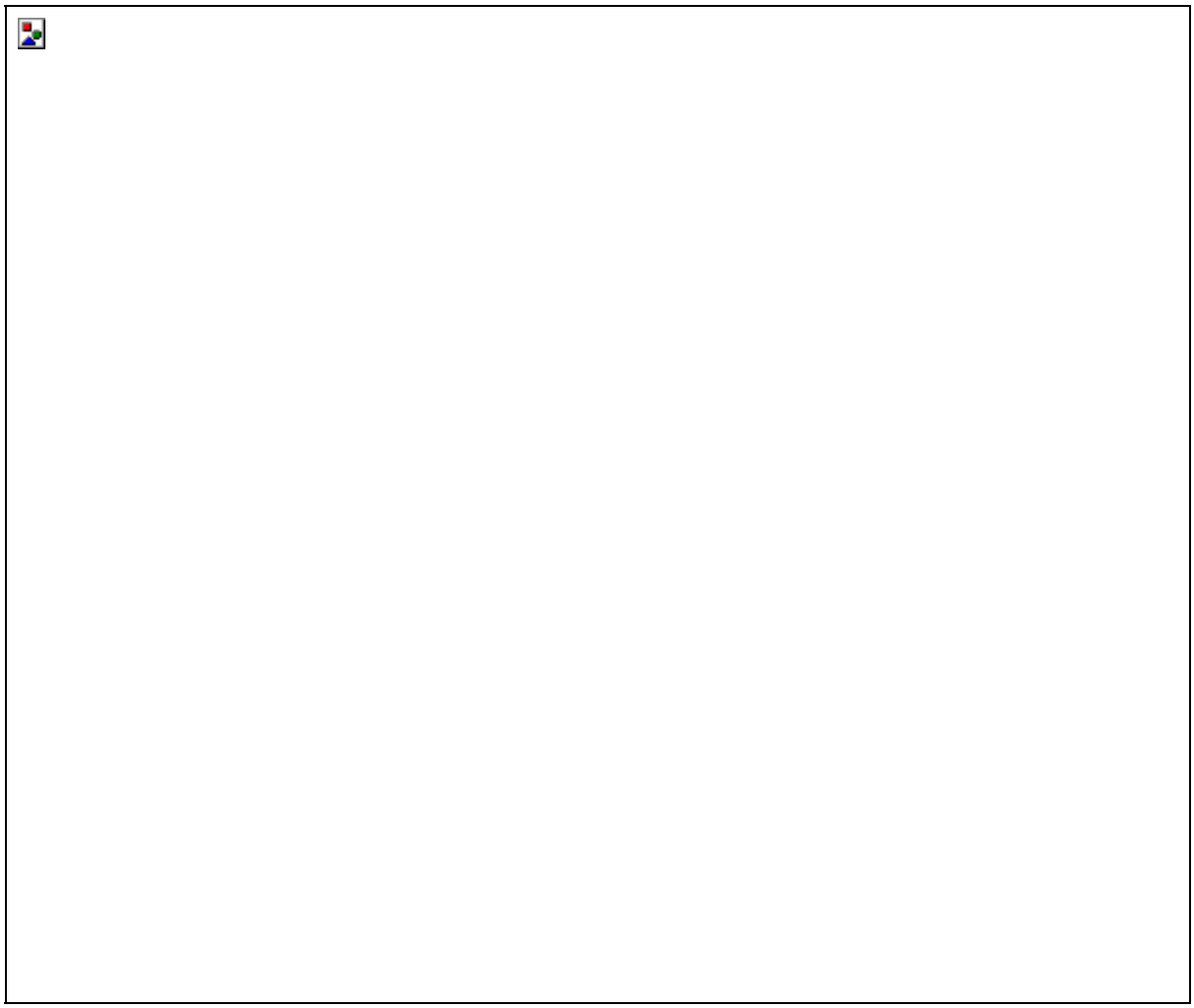
Note 6: Pulse width 50 μs, duty cycle 10%
Output impedance 50 Ω, $t_r \leqq 5$ ns, $t_f \leqq 10$ ns

Note 7: C_L includes probe and jig capacitance.

Caution on Application

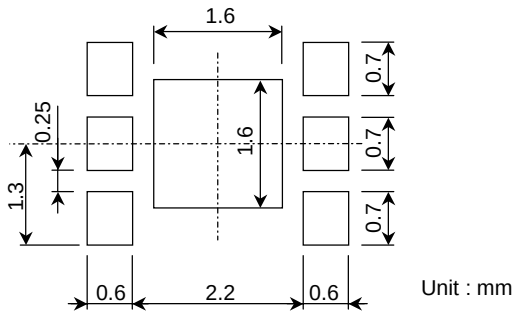
1. The device does not include protectors such as an overcurrent protector and an overvoltage protector. Applying excessive current or voltage may damage the device.
   Thus, design with great care to prevent excessive current or voltage from being applied to the device. The device may also be damaged by short-circuits between outputs and power supply/ground.
   Take care when designing output, V_{CC} 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

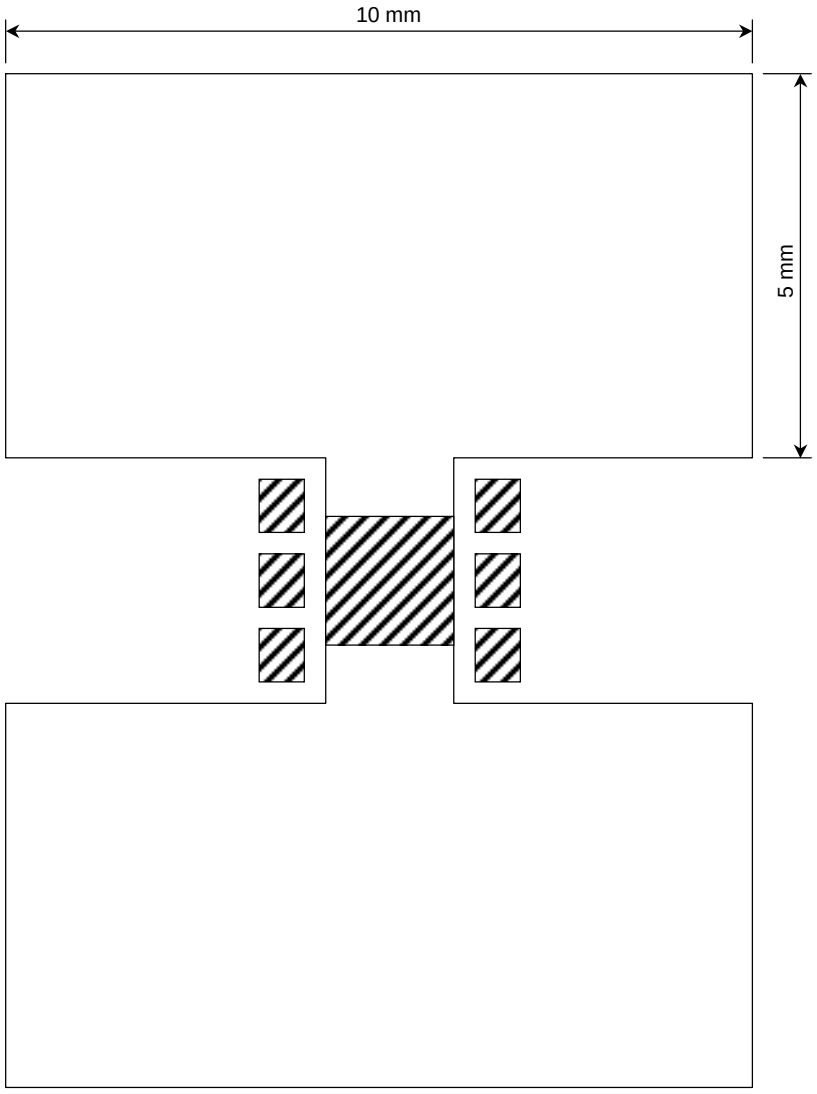


Weight: 0.017 g (typ.)

Preliminary land pattern



Preliminary PCB trace dimension



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