

**DESCRIPTION** The 2SB1093 is a darlington transistor including a dumper diode at C-E.

It is suitable for general driving use, such as hammer, solenoid, lamp or motor.

- FEATURES**
- High DC current gain.
  - High current capability, wide ASO and low collector saturation voltage.
  - Includes a dumper diode at C-E.
  - A complementary pair with NEC's 2SD1579.

### ABSOLUTE MAXIMUM RATINGS

#### Maximum Temperatures

Storage Temperature . . . . . -55 to +150 °C

Junction Temperature . . . . . 150 °C Maximum

#### Maximum Power Dissipation ( $T_a = 25\text{ °C}$ )

Total Power Dissipation . . . . . 1.0 W

#### Maximum Voltages and Currents ( $T_a = 25\text{ °C}$ )

$V_{CBO}$  Collector to Base Voltage . . . . . -80 V

$V_{CEO}$  Collector to Emitter Voltage . . . . . -80 V

$V_{EBO}$  Emitter to Base Voltage . . . . . -8.0 V

$I_C$  Collector Current (DC) . . . . .  $\mp 1.5$  A

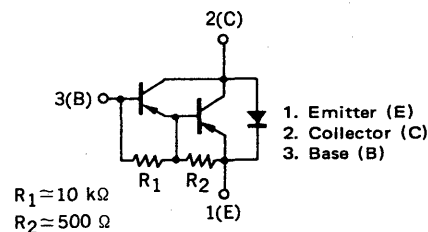
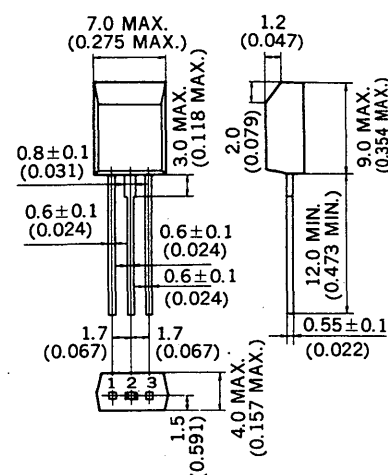
$I_C$  Collector Current (Pulse)\* . . . . .  $\mp 3.0$  A

$I_B$  Base Current (DC) . . . . . -0.15 A

\*PW  $\leq$  300  $\mu$ s, Duty Cycle  $\leq$  10 %

### PACKAGE DIMENSIONS

in millimeters (inches)



### ELECTRICAL CHARACTERISTICS ( $T_a = 25\text{ °C}$ )

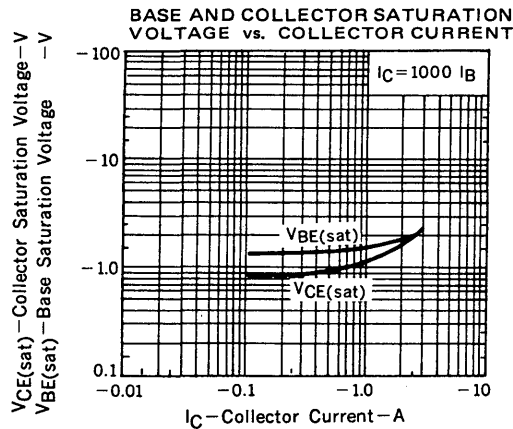
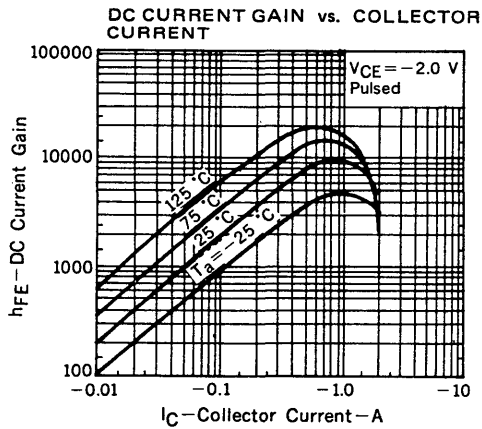
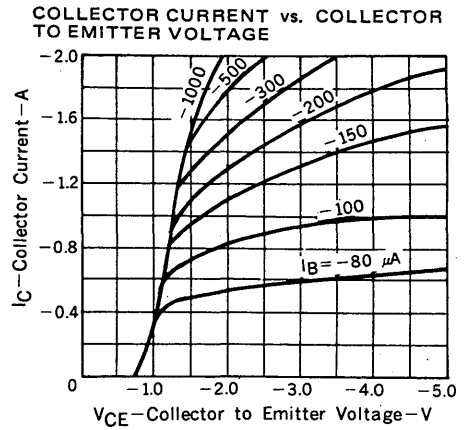
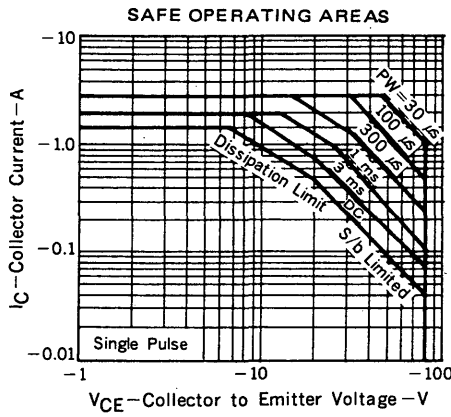
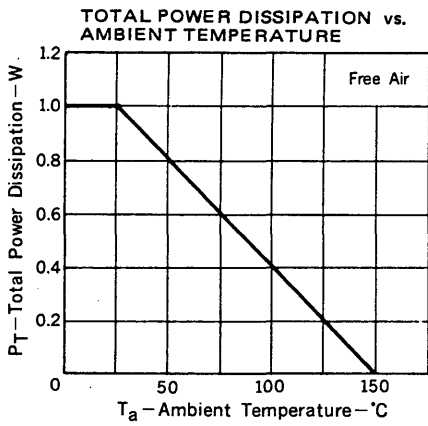
SYMBOL	CHARACTERISTIC	MIN.	TYP.	MAX.	UNIT	TEST CONDITIONS
$h_{FE1}$	DC Current Gain	1000			-	$V_{CE} = -2.0$ V, $I_C = -0.5$ A
$h_{FE2}$	DC Current Gain	2000		30000	-	$V_{CE} = -2.0$ V, $I_C = -1.0$ A
$t_{on}$	Turn-On Time		0.5		$\mu$ s	$(I_C = -1.0$ A, $R_L = 50$ $\Omega$ , $I_{B1} = -I_{B2} = -1.0$ mA, $V_{CC} = -50$ V) See Test Circuit
$t_{stg}$	Storage Time		1.0		$\mu$ s	
$t_f$	Fall Time		1.0		$\mu$ s	
$I_{CBO}$	Collector Cutoff Current			-10	$\mu$ A	$V_{CB} = -80$ V, $I_E = 0$
$I_{CER}$	Collector Cutoff Current			-1.0	mA	$V_{CE} = -80$ V, $R_{BE} = 51$ $\Omega$ , $T_a = 125\text{ °C}$
$I_{CEX1}$	Collector Cutoff Current			-10	$\mu$ A	$V_{CE} = -80$ V, $V_{BE(off)} = -1.5$ V
$I_{CEX2}$	Collector Cutoff Current			-1.0	mA	$V_{CE} = -80$ V, $V_{BE(off)} = -1.5$ V, $T_a = 125\text{ °C}$
$I_{EBO}$	Emitter Cutoff Current			-1.0	mA	$V_{EB} = -5.0$ V, $I_C = 0$
$V_{CE(sat)}$	Collector Saturation Voltage			-1.5	V	$I_C = -1.0$ A, $I_B = -1.0$ mA
$V_{BE(sat)}$	Base Saturation Voltage			-2.0	V	
$f_T$	Gain Bandwidth Product		80		MHz	$V_{CE} = -10$ V, $I_E = 1.0$ A

### Classification of $h_{FE2}$

Rank	M	L	K
Range	2000 - 5000	4000 - 10000	8000 - 30000

Test Conditions:  $V_{CE} = -2.0$  V,  $I_C = -1.0$  A

TYPICAL CHARACTERISTICS ( $T_a = 25^\circ\text{C}$ )



SWITCHING TIME ( $t_{on}$ ,  $t_{stg}$ ,  $t_f$ ) TEST CURCUIT

