

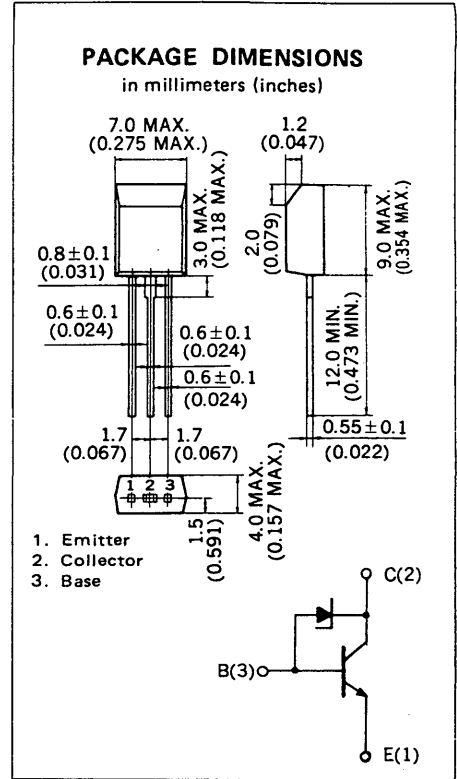
**DESCRIPTION** The 2SD1780 is high  $h_{FE}$  transistor, built-in a zener diode at B-C.  
It is suitable for use to operate from IC without predriver, such as hammer or motor driver.

- FEATURES**
- Built in 60 V Zener Diode at B-C.
  - High DC Current Gain.  
 $h_{FE} = 800$  to  $3200$  ( $@V_{CE} = 5.0$  V,  $I_C = 1.0$  A)
  - Wide "SOA".  
 $V_{CEO} = 60 \pm 10$  V,  $I_{C(DC)} = 2.0$  A
  - Low Collector Saturation Voltage.  
 $V_{CE(sat)} = 0.20$  TYP. ( $@I_C = 1.0$  A,  $I_B = 10$  mA)

**ABSOLUTE MAXIMUM RATINGS**

- Maximum Temperatures
- Storage Temperature . . . . .  $-55$  to  $+150$  °C
  - Junction Temperature . . . . .  $150$  °C Maximum
- Maximum Power Dissipation ( $T_a = 25$  °C)
- Total Power Dissipation . . . . .  $1.0$  W
- Maximum Voltages and Currents ( $T_a = 25$  °C)
- $V_{CBO}$  Collector to Base Voltage . . . . .  $60 \pm 10$  V
  - $V_{CEO}$  Collector to Emitter Voltage . . . . .  $60 \pm 10$  V
  - $V_{EBO}$  Emitter to Base Voltage . . . . .  $15$  V
  - $I_C$  Collector Current (DC) . . . . .  $2.0$  A
  - $I_C^*$  Collector Current (pulse) . . . . .  $3.0$  A

\*  $PW \leq 10$  ms, Duty Cycle  $\leq 50$  %



**ELECTRICAL CHARACTERISTICS ( $T_a = 25$  °C)**

SYMBOL	CHARACTERISTIC	MIN.	TYP.	MAX.	UNIT	TEST CONDITIONS
$V_{CBO}$	Collector to Base Voltage	50	60	70	V	$I_C = 1.0$ mA, $I_E = 0$
$V_{CEO}$	Collector to Emitter Voltage	50	60	70	V	$I_C = 10$ mA, $R_{BE} = \infty$
$h_{FE1}^{**}$	DC Current Gain	800	1500	3200	—	$V_{CE} = 5.0$ V, $I_C = 1.0$ A
$h_{FE2}^{**}$	DC Current Gain	500			—	$V_{CE} = 5.0$ V, $I_C = 2.0$ A
$I_{CBO}$	Collector Cutoff Current			100	nA	$V_{CB} = 40$ V, $I_E = 0$
$I_{EBO}$	Base Cutoff Current			100	nA	$V_{EB} = 12$ V, $I_C = 0$
$V_{CE(sat)1}^{**}$	Collector Saturation Voltage		0.1	0.2	V	$I_C = 0.5$ A, $I_B = 5.0$ mA
$V_{CE(sat)2}^{**}$	Collector Saturation Voltage		0.2	0.3	V	$I_C = 1.0$ A, $I_B = 10$ mA
$V_{BE(sat)}^{**}$	Base Saturation Voltage		0.8	1.2	V	$I_C = 1.0$ A, $I_B = 10$ mA
$t_{on}$	Turn On Time		0.8		$\mu$ s	$I_C = 1.0$ A $I_{B1} = -I_{B2} = 10$ mA $R_L = 20$ $\Omega$ , $V_{CC} = 20$ V
$t_{stg}$	Storage Time		2.0		$\mu$ s	
$t_f$	Fall Time		1.2		$\mu$ s	

\*\*  $PW \leq 350$   $\mu$ s, Duty Cycle  $\leq 2$  %

**Classification of  $h_{FE1}$**

Rank	M	L	K
Range	800 to 1600	1200 to 2400	2000 to 3200

Test Conditions:  $V_{CE} = 5.0$  V,  $I_C = 1.0$  A

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

