NEC

NPN SILICON TRANSISTOR
2SD1780

DESCRIPTION

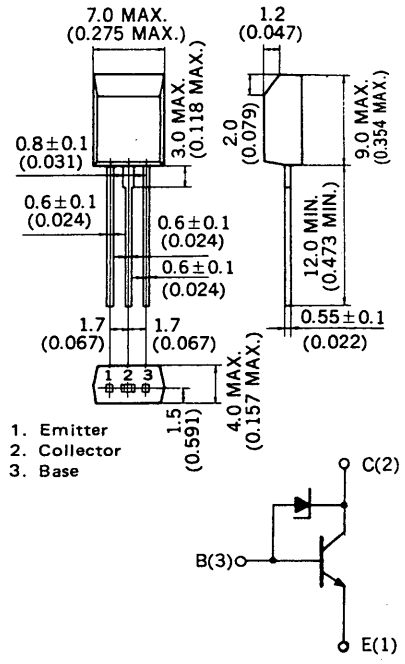
The 2SD1780 is high h_{FE} transistor, built-in a zener diode at B-C.

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 ± 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)

PACKAGE DIMENSIONS
in millimeters (inches)



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 ± 10	V
V_{CEO}	Collector to Emitter Voltage	60 ± 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 ≦ 10 ms, Duty Cycle ≦ 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} = ∞
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		μs	I_C = 1.0 A
t_{stg}	Storage Time		2.0		μs	I_{B1} = −I_{B2} = 10 mA
t_f	Fall Time		1.2		μs	R_L = 20 Ω, V_{CC} = 20 V

** PW ≦ 350 μs, Duty Cycle ≦ 2 %

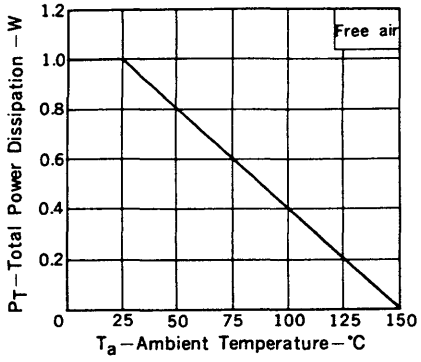
Classification of h_{FE1}

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

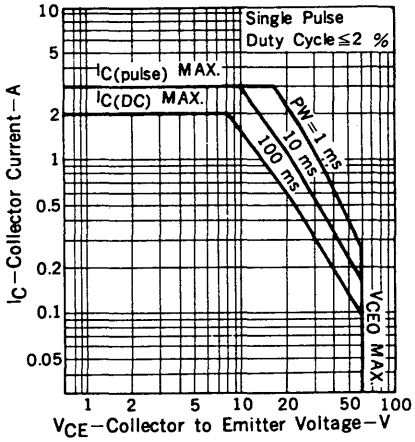
Test Conditions: V_{CE} = 5.0 V, I_C = 1.0 A

TYPICAL CHARACTERISTICS (T_a = 25 °C)

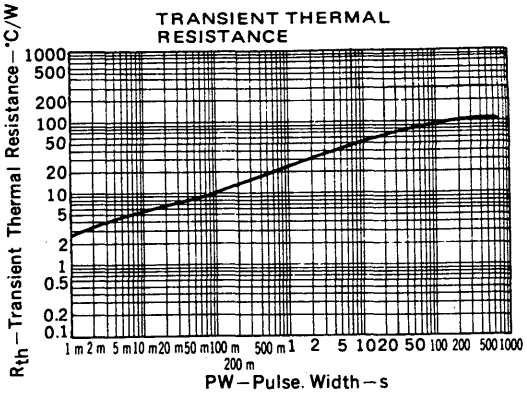
TOTAL POWER DISSIPATION vs. AMBIENT TEMPERATURE



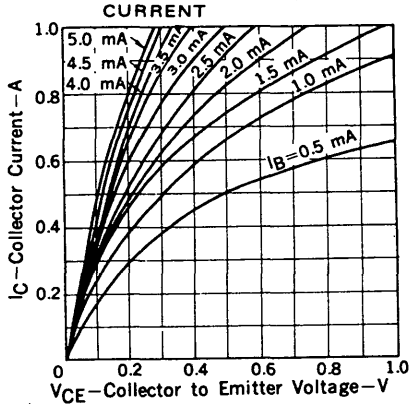
SAFE OPERATING AREA (TRANSIENT THERMAL METHOD)



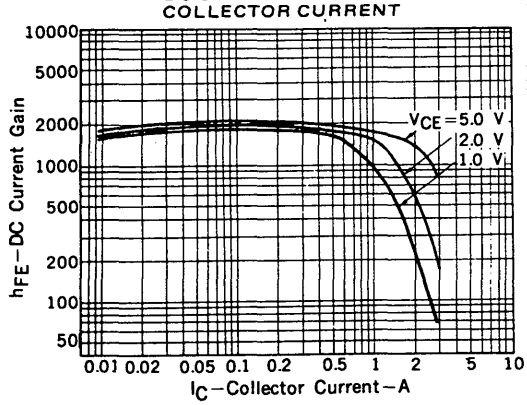
TRANSIENT THERMAL RESISTANCE



COLLECTOR TO EMITTER VOLTAGE vs. COLLECTOR CURRENT



DC CURRENT GAIN vs. COLLECTOR CURRENT



COLLECTOR AND BASE SATURATION VOLTAGE vs. COLLECTOR CURRENT