

**PNP SILICON TRIPLE DIFFUSED TRANSISTOR**  
**MP-3****DESCRIPTION**

2SA1412-Z is designed for High Voltage Switching, especially in Hybrid Integrated Circuits.

**FEATURES**

- High Voltage :  $V_{CE0} \approx -400$  V
- High Speed :  $t_r \leq 0.7$   $\mu$ s
- Complement to 2SC3631-Z

**QUALITY GRADE**

Standard

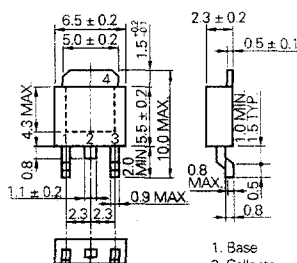
Please refer to "Quality grade on NEC Semiconductor Devices" (Document number IEI-1209) published by NEC Corporation to know the specification of quality grade on the devices and its recommended applications.

**ABSOLUTE MAXIMUM RATINGS ( $T_a = 25$  °C)**

|                                            |           |             |    |
|--------------------------------------------|-----------|-------------|----|
| Collector to Base Voltage                  | $V_{CBO}$ | -400        | V  |
| Collector to Emitter Voltage               | $V_{CEO}$ | -400        | V  |
| Emitter to Base Voltage                    | $V_{EBO}$ | -7          | V  |
| Collector Current (DC)                     | $I_C$     | -2.0        | A  |
| Collector Current (Pulse)*                 | $I_C$     | -4.0        | A  |
| Total Power Dissipation ( $T_a = 25$ °C)** | $P_T$     | 2.0         | W  |
| Junction Temperature                       | $T_j$     | 150         | °C |
| Storage Temperature                        | $T_{stg}$ | -55 to +150 | °C |

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

\*\* When mounted on ceramic substrate of  $7.5 \text{ cm}^2 \times 0.7 \text{ mm}$

**PACKAGE DIMENSIONS**  
(in millimeters)

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

| CHARACTERISTIC               | SYMBOL          | MIN. | TYP.  | MAX. | UNIT          | TEST CONDITIONS                                            |
|------------------------------|-----------------|------|-------|------|---------------|------------------------------------------------------------|
| Collector Cutoff Current     | $I_{CBO}$       |      |       | -10  | $\mu\text{A}$ | $V_{CB} = -400\text{ V}$ , $I_E = 0$                       |
| Emitter Cutoff Current       | $I_{EBO}$       |      |       | -10  | $\mu\text{A}$ | $V_{EB} = -5.0\text{ V}$ , $I_C = 0$                       |
| DC Current Gain              | $h_{FE1}^*$     | 40   | 60    | 120  |               | $V_{CE} = -5.0\text{ V}$ , $I_C = -0.1\text{ A}$           |
| DC Current Gain              | $h_{FE2}^*$     | 10   | 22    |      |               | $V_{CE} = -5.0\text{ V}$ , $I_C = -1.0\text{ A}$           |
| Collector Saturation Voltage | $V_{CE(sat)}^*$ |      | -0.25 | -0.5 | V             | $I_C = -0.5\text{ A}$ , $I_B = -0.1\text{ A}$              |
| Base Saturation Voltage      | $V_{BE(sat)}^*$ |      | -0.85 | -1.2 | V             | $I_C = -0.5\text{ A}$ , $I_B = -0.1\text{ A}$              |
| Gain Bandwidth Product       | $f_T$           |      | 40    |      | MHz           | $V_{CE} = -10\text{ V}$ , $I_E = -100\text{ mA}$           |
| Output Capacitance           | $C_{ob}$        |      | 30    |      | pF            | $V_{CB} = -10\text{ V}$ , $I_E = 0$ , $f = 1.0\text{ MHz}$ |
| Turn-on Time                 | $t_{on}$        |      | 0.03  | 0.5  | $\mu\text{s}$ | $I_C = -1.0\text{ A}$ , $R_L = 150\ \Omega$                |
| Storage Time                 | $t_{stg}$       |      | 1.4   | 2.0  | $\mu\text{s}$ | $I_{B1} = -I_{B2} = -0.2\text{ A}$ ,                       |
| Fall time                    | $t_r$           |      | 0.1   | 0.7  | $\mu\text{s}$ | $V_{CC} = -150\text{ V}$                                   |

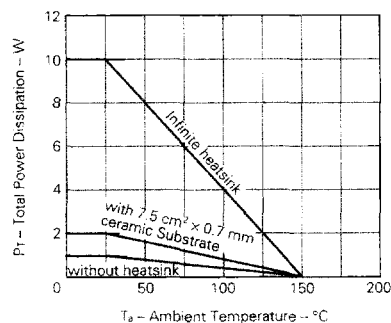
\* Pulsed:  $PW \leq 350\ \mu\text{s}$ , Duty Cycle  $\leq 2\%$

$h_{FE}$  Classification

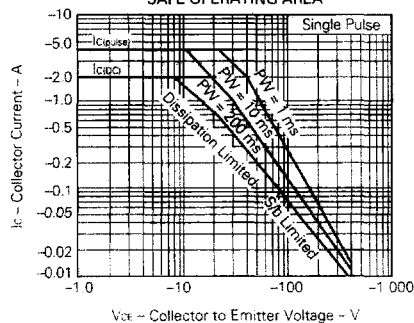
| MARKING   | L        | K         |
|-----------|----------|-----------|
| $h_{FE1}$ | 40 to 80 | 60 to 120 |

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

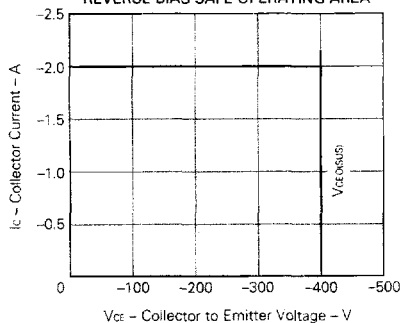
TOTAL POWER DISSIPATION vs. AMBIENT TEMPERATURE



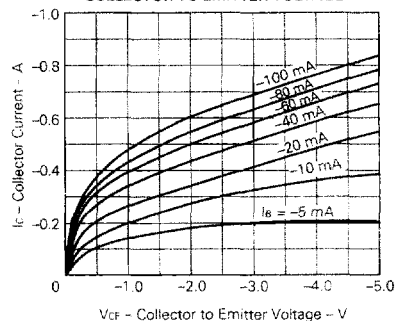
SAFE OPERATING AREA

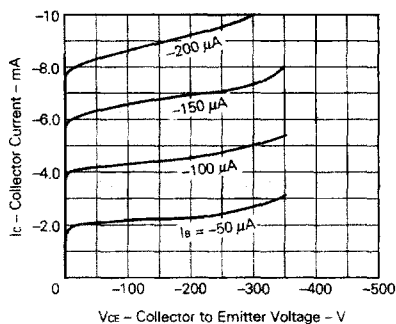
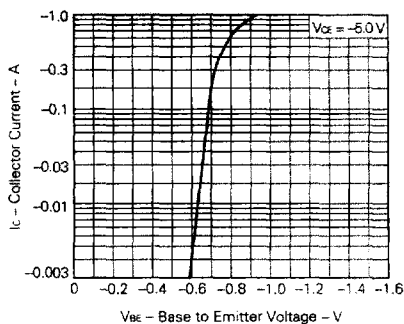
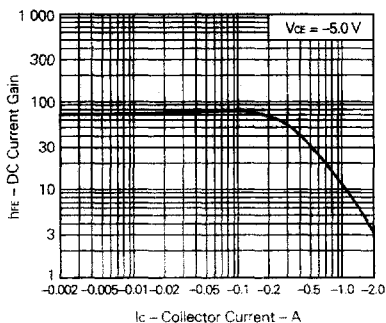
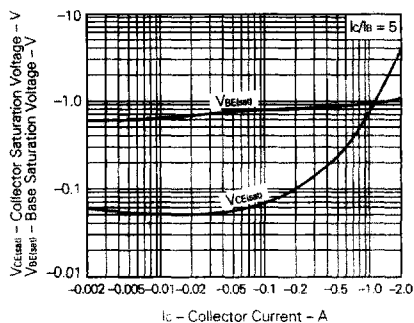


REVERSE BIAS SAFE OPERATING AREA



COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE



COLLECTOR CURRENT vs.  
COLLECTOR TO EMITTER VOLTAGECOLLECTOR CURRENT vs.  
BASE TO EMITTER VOLTAGEDC CURRENT GAIN vs.  
COLLECTOR CURRENTCOLLECTOR AND BASE SATURATION  
VOLTAGE vs. COLLECTOR CURRENT

TURN-OFF TIME vs. COLLECTOR CURRENT

