

Silicon NPN Power Transistors

2SD1406

DESCRIPTION

- With TO-220Fa package
- Collector power dissipation : $P_C=25W@T_C=25^{\circ}C$
- Low collector saturation voltage
- Complement to type 2SB1015

APPLICATIONS

- For audio frequency power amplifier applications

PINNING

| PIN | DESCRIPTION |
|-----|-------------|
| 1   | Base        |
| 2   | Collector   |
| 3   | Emitter     |

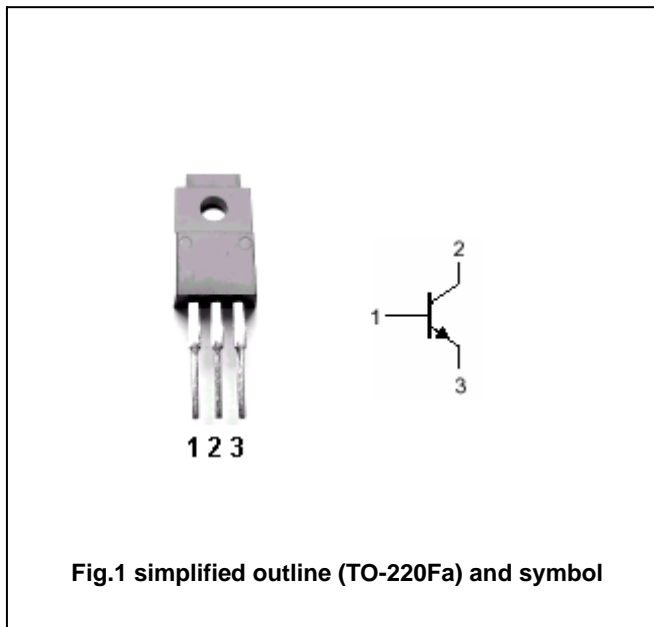


Fig.1 simplified outline (TO-220Fa) and symbol

Absolute maximum ratings( $T_a=25^{\circ}C$ )

| SYMBOL    | PARAMETER                   | CONDITIONS        | VALUE   | UNIT        |
|-----------|-----------------------------|-------------------|---------|-------------|
| $V_{CBO}$ | Collector-base voltage      | Open emitter      | 60      | V           |
| $V_{CEO}$ | Collector -emitter voltage  | Open base         | 60      | V           |
| $V_{EBO}$ | Emitter-base voltage        | Open collector    | 7       | V           |
| $I_C$     | Collector current           |                   | 3       | A           |
| $I_B$     | Base current                |                   | 0.5     | A           |
| $P_C$     | Collector power dissipation | $T_a=25^{\circ}C$ | 2.0     | W           |
|           |                             | $T_C=25^{\circ}C$ | 25      |             |
| $T_j$     | Junction temperature        |                   | 150     | $^{\circ}C$ |
| $T_{stg}$ | Storage temperature         |                   | -55~150 | $^{\circ}C$ |

## Silicon NPN Power Transistors

## 2SD1406

## CHARACTERISTICS

T<sub>j</sub>=25°C unless otherwise specified

| SYMBOL               | PARAMETER                            | CONDITIONS                                      | MIN | TYP. | MAX | UNIT |
|----------------------|--------------------------------------|---|-----|------|-----|------|
| V <sub>(BR)CEO</sub> | Collector-emitter breakdown voltage  | I <sub>C</sub> =50mA; I <sub>B</sub> =0         | 60  |      |     | V    |
| V <sub>CEsat</sub>   | Collector-emitter saturation voltage | I <sub>C</sub> =3A; I <sub>B</sub> =0.3A        |     | 0.25 | 1.0 | V    |
| V <sub>BE</sub>      | Base-emitter voltage                 | I <sub>C</sub> =0.5A; V <sub>CE</sub> =5V       |     | 0.7  | 1.0 | V    |
| I <sub>CBO</sub>     | Collector cut-off current            | V <sub>CB</sub> =60V; I <sub>E</sub> =0         |     |      | 100 | μA   |
| I <sub>EBO</sub>     | Emitter cut-off current              | V <sub>EB</sub> =7V; I <sub>C</sub> =0          |     |      | 100 | μA   |
| h <sub>FE-1</sub>    | DC current gain                      | I <sub>C</sub> =0.5A; V <sub>CE</sub> =5V       | 60  |      | 300 |      |
| h <sub>FE-2</sub>    | DC current gain                      | I <sub>C</sub> =3A; V <sub>CE</sub> =5V         | 20  |      |     |      |
| f <sub>T</sub>       | Transition frequency                 | I <sub>C</sub> =0.5A; V <sub>CE</sub> =5V       |     | 3    |     | MHz  |
| C <sub>OB</sub>      | Collector output capacitance         | I <sub>E</sub> =0; f=1MHz; V <sub>CB</sub> =10V |     | 70   |     | pF   |

## Switching times

|                 |              |  |  |     |  |    |
|-----------------|--------------|--|--|-----|--|----|
| t <sub>on</sub> | Trun-on time | R <sub>L</sub> =15Ω; V <sub>CC</sub> =30V<br>I <sub>B1</sub> =-I <sub>B2</sub> =0.2A |  | 0.8 |  | μs |
| t <sub>s</sub>  | Storage time |  |  | 1.5 |  | μs |
| t <sub>f</sub>  | Fall time    |  |  | 0.8 |  | μs |

◆ h<sub>FE-1</sub> Classifications

| O      | Y       | GR      |
|--------|---------|---------|
| 60-120 | 100-200 | 150-300 |

PACKAGE OUTLINE

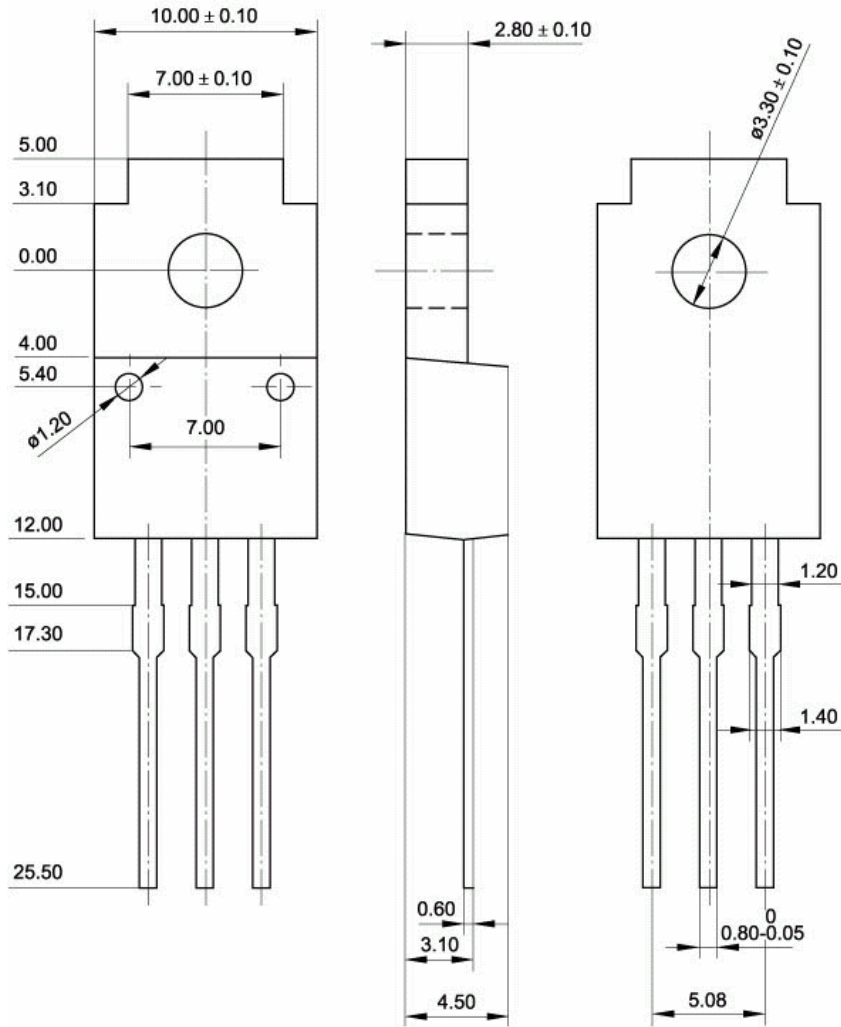


Fig.2 Outline dimensions (unindicated tolerance:  $\pm 0.15$  mm)

Silicon NPN Power Transistors

2SD1406

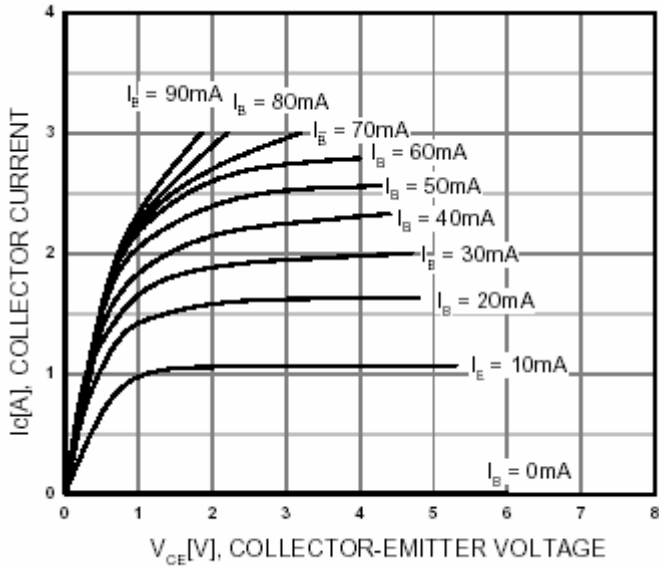


Fig.3 Static Characteristic

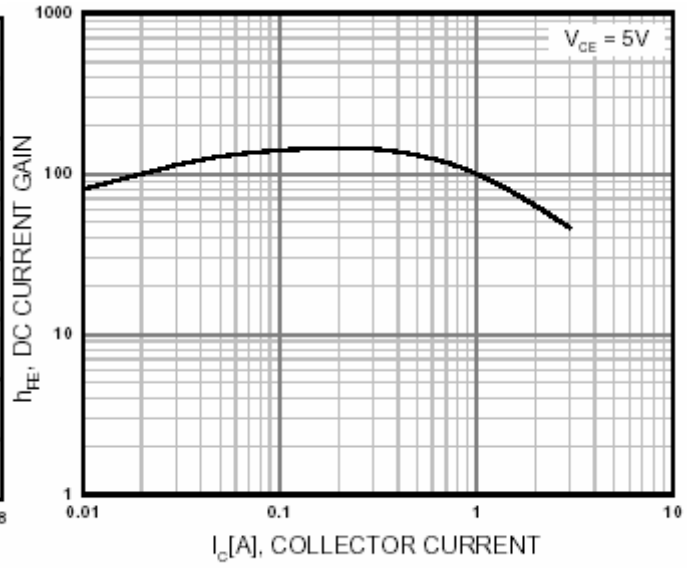


Fig.4 DC current Gain

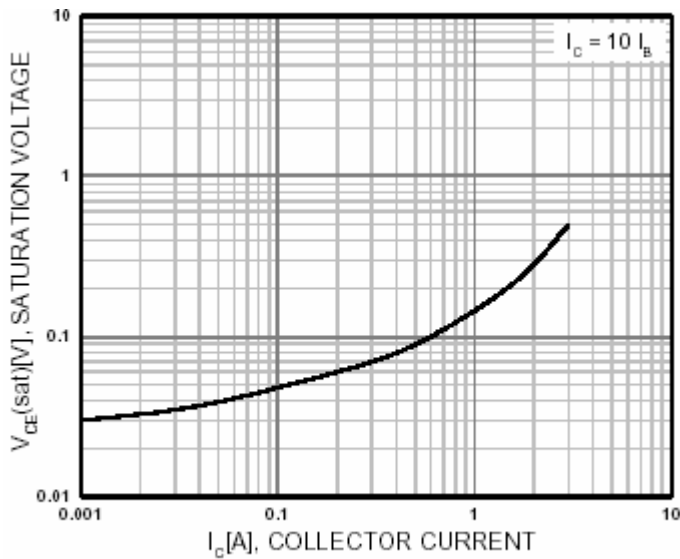


Fig.5 Collector-Emitter Saturation Voltage

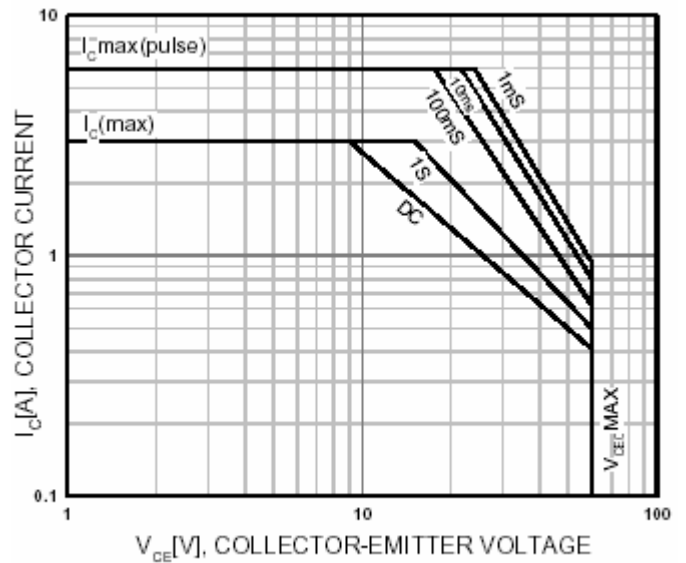


Fig.6 Safe Operating Area