

# Medium Power Transistor (Motor, Relay drive) (60±10V, 2A)

## 2SD2212 / 2SD2143 / 2SD1866

### ●Features

- 1) Built-in zener diode between collector and base.
- 2) Strong protection against reverse surges due to "L" loads.
- 3) Built-in resistor between base and emitter.
- 4) Built-in damper diode.

### ●Absolute maximum ratings (Ta=25°C)

| Parameter                   | Symbol           | Limits      | Unit        |
|-----------------------------|------------------|-------------|-------------|
| Collector-base voltage      | V <sub>CB0</sub> | 60±10       | V           |
| Collector-emitter voltage   | V <sub>CE0</sub> | 60±10       | V           |
| Emitter-base voltage        | V <sub>EB0</sub> | 6           | V           |
| Collector current           | I <sub>c</sub>   | 2           | A (DC)      |
|                             |                  | 3 *1        | A (Pulse)   |
| Collector power dissipation | P <sub>c</sub>   | 0.5         | W           |
|                             |                  | 2 *2        | W           |
|                             |                  | 1           | W           |
|                             |                  | 10          | W (Tc=25°C) |
| Junction temperature        | T <sub>j</sub>   | 150         | °C          |
| Storage temperature         | T <sub>stg</sub> | -55 to +150 | °C          |

\*1 Single pulse Pw=100ms

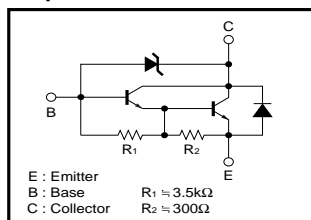
\*2 When mounted on a 40×40×0.7mm ceramic board.

\*3 Printed circuit board 1.7mm thick, collector plating 1cm<sup>2</sup> or larger.

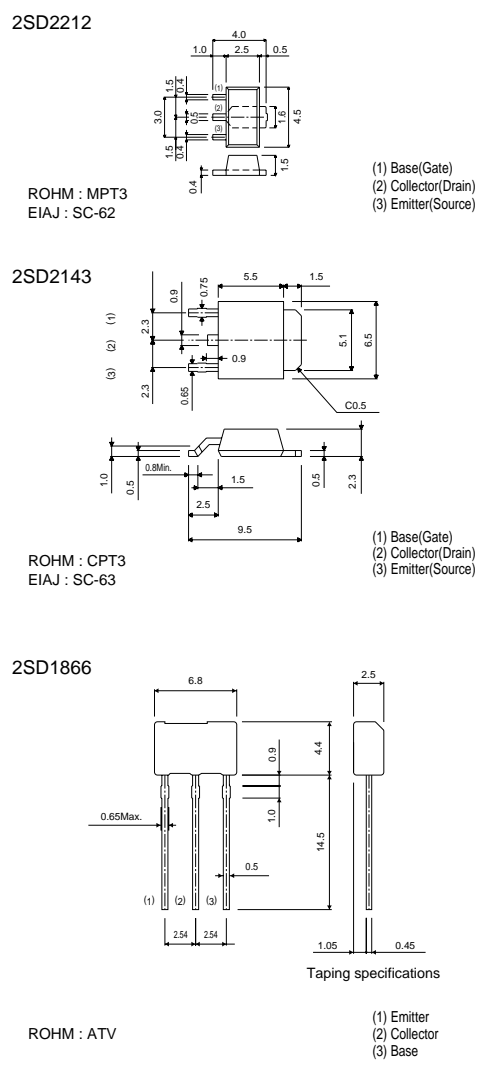
### ●Packaging specifications and hFE

| Type                         | 2SD2212   | 2SD2143   | 2SD1866   |
|------------------------------|-----------|-----------|-----------|
| Package                      | MPT3      | CPT3      | ATV       |
| hFE                          | 1k to 10k | 1k to 10k | 1k to 10k |
| Marking                      | DR        | -         | -         |
| Code                         | T100      | TL        | TV2       |
| Basic ordering unit (pieces) | 1000      | 2500      | 2500      |

### ●Equivalent circuit



### ●External dimensions (Unit : mm)



Transistors

●Electrical characteristics (Ta=25°C)

| Parameter                            | Symbol        | Min. | Typ. | Max.  | Unit    | Conditions                      |
|--------------------------------------|---------------|------|------|-------|---------|---------------------------------|
| Collector-base breakdown voltage     | $BV_{CBO}$    | 50   | —    | 70    | V       | $I_C=50\mu A$                   |
| Collector-emitter breakdown voltage  | $BV_{CEO}$    | 50   | —    | 70    | V       | $I_C=5mA$                       |
| Collector cutoff current             | $I_{CBO}$     | —    | —    | 1.0   | $\mu A$ | $V_{CE}=40V$                    |
| Emitter cutoff current               | $I_{EBO}$     | —    | —    | 3     | mA      | $V_{EB}=5V$                     |
| Collector-emitter saturation voltage | $V_{CE(sat)}$ | —    | —    | 1.5   | V       | $I_C/I_B=1A/1mA$ *              |
| DC current transfer ratio            | $h_{FE}$      | 1000 | —    | 10000 | —       | $V_{CE}=2V, I_C=1A$             |
| Transition frequency                 | $f_t$         | —    | 80   | —     | MHz     | $V_{CE}=5V, I_E=-0.1A, f=30MHz$ |
| Output capacitance                   | $C_{ob}$      | —    | 25   | —     | pF      | $V_{CB}=10V, I_E=0A, f=1MHz$    |

\* Measured using pulse current.

●Electrical characteristics curves

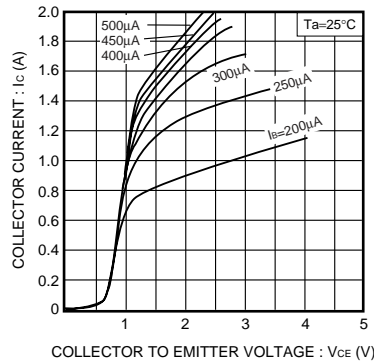


Fig.1 Grounded emitter output characteristics ( I )

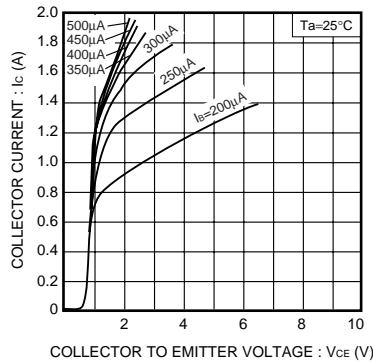


Fig.2 Grounded emitter output characteristics ( II )

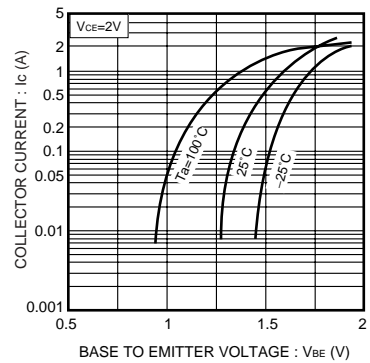


Fig.3 Grounded emitter propagation characteristics

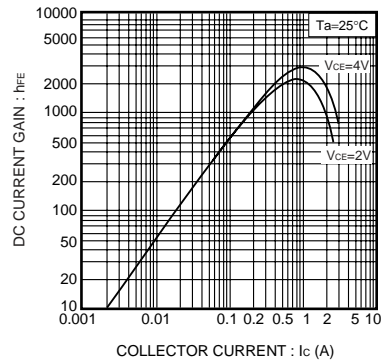


Fig.4 DC current gain vs. collector current ( I )

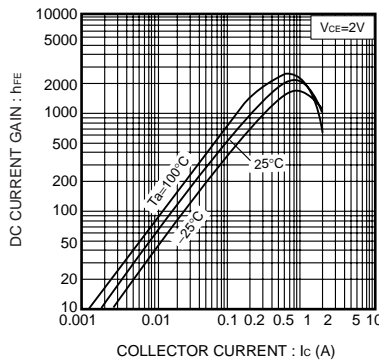


Fig.5 DC current gain vs. collector current ( II )

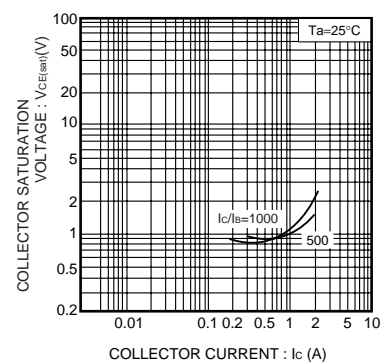


Fig.6 Collector-emitter saturation voltage vs. collector current

Transistors

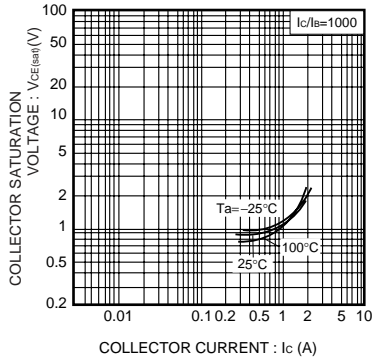


Fig.7 Collector-emitter saturation voltage vs. collector current

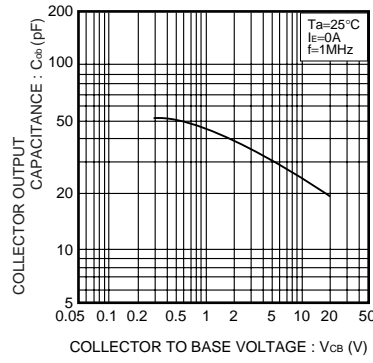


Fig.8 Collector output capacitance vs. collector-base voltage

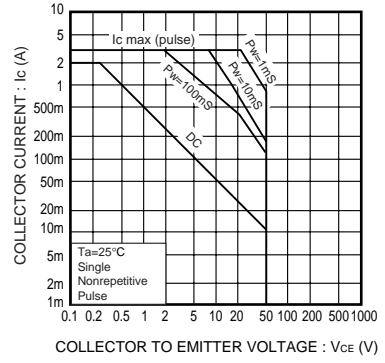


Fig.9 Safe operating area (A. S. O) 2SD2212 (MPT)

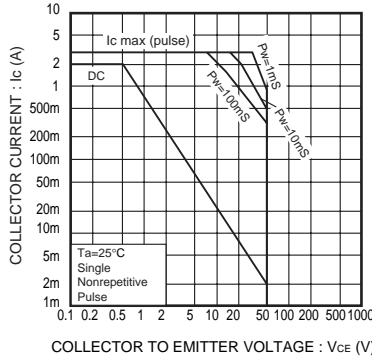


Fig.10 Safe operating area (A. S. O) 2SD2143 (CPT)

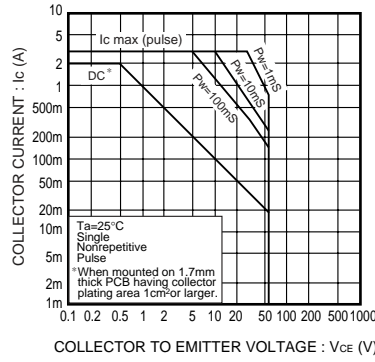


Fig.11 Safe operating area (A. S. O) 2SD1866 (ATV)

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