

# Medium Power Transistor (Motor or Relay drive)

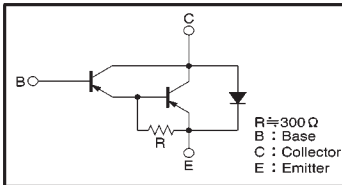
## (-80V, -4A)

### 2SB1616

#### ●Features

- 1) Darlington connection for a high  $h_{FE}$ .
- 2) Built-in resistor between base and emitter.
- 3) Built-in damper diode.
- 4) Complements the 2SD2478.

#### ●Circuit diagram



#### ●Electrical characteristics (Ta=25°C)

| Parameter                            | Symbol        | Min. | Typ. | Max.  | Unit          | Conditions   |
|--------------------------------------|---------------|------|------|-------|---------------|--|
| Collector-emitter breakdown voltage  | $BV_{CEO}$    | -80  | —    | —     | V             | $I_C = -1\text{mA}$  |
| Collector-base breakdown voltage     | $BV_{CBO}$    | -80  | —    | —     | V             | $I_C = -50\mu\text{A}$   |
| Emitter-base breakdown voltage       | $BV_{EBO}$    | -7   | —    | —     | V             | $I_E = -50\mu\text{A}$   |
| Collector cutoff current             | $I_{CBO}$     | —    | —    | -10   | $\mu\text{A}$ | $V_{CE} = -80\text{V}$   |
| Emitter cutoff current               | $I_{EBO}$     | —    | —    | -10   | $\mu\text{A}$ | $V_{EB} = -5\text{V}$  |
| Collector-emitter saturation voltage | $V_{CE(sat)}$ | —    | -1.5 | —     | V             | $I_C/I_E = -2\text{A}/-4\text{mA}$ *1                              |
| DC current transfer ratio            | $h_{FE}$      | 1000 | —    | 10000 | —             | $V_{CE}/I_C = -3\text{V}/-2\text{A}$ *1                            |
| Transition frequency                 | $f_T$         | —    | 20   | —     | MHz           | $V_{CE} = 5\text{V}$ , $I_E = -50\text{mA}$ , $f = 5\text{MHz}$ *2 |
| Output capacitance                   | $C_{ob}$      | —    | 22   | —     | pF            | $V_{CB} = -10\text{V}$ , $I_E = 0\text{A}$ , $f = 1\text{MHz}$     |

\*1 Measured using pulse current.

\*2 Transition frequency of the device.

(SPEC-B426)

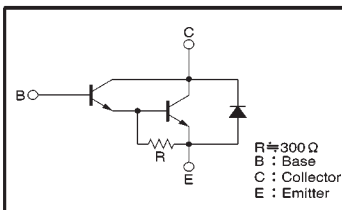
# Power Transistor (80V, 4A)

### 2SD2478

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- 1) Darlington connection for a high  $h_{FE}$ .
- 2) Built-in resistor between base and emitter.
- 3) Built-in damper diode.
- 4) Complements the 2SB1616.

#### ●Circuit diagram



#### ●Electrical characteristics (Ta=25°C)

| Parameter                            | Symbol        | Min. | Typ. | Max.  | Unit          | Conditions  |
|--------------------------------------|---------------|------|------|-------|---------------|---|
| Collector-base breakdown voltage     | $BV_{CBO}$    | 80   | —    | —     | V             | $I_C = 50\mu\text{A}$   |
| Collector-emitter breakdown voltage  | $BV_{CEO}$    | 80   | —    | —     | V             | $I_C = -1\text{mA}$   |
| Collector cutoff current             | $I_{CBO}$     | —    | —    | 100   | $\mu\text{A}$ | $V_{CB} = 80\text{V}$   |
| Emitter cutoff current               | $I_{EBO}$     | —    | —    | 10    | $\mu\text{A}$ | $V_{EB} = 5\text{V}$  |
| Collector-emitter saturation voltage | $V_{CE(sat)}$ | —    | -1.5 | —     | V             | $I_C/I_E = 2\text{A}/4\text{mA}$ *1                                 |
| DC current transfer ratio            | $h_{FE}$      | 1000 | —    | 10000 | —             | $V_{CE}/I_C = 3\text{V}/2\text{A}$ *1                               |
| Transition frequency                 | $f_T$         | —    | 40   | —     | MHz           | $V_{CE} = -5\text{V}$ , $I_E = 0.5\text{A}$ , $f = 10\text{MHz}$ *2 |
| Output capacitance                   | $C_{ob}$      | —    | 35   | —     | pF            | $V_{CB} = 10\text{V}$ , $I_E = 0\text{A}$ , $f = 1\text{MHz}$       |

\*1 Measured using pulse current.

\*2 Transition frequency of the device.

(94L-1129-D426)

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

| Parameter                   | Symbol    | Limits   | Unit        |
|-----------------------------|-----------|----------|-------------|
| Collector-base voltage      | $V_{CBO}$ | -80      | V           |
| Collector-emitter voltage   | $V_{CEO}$ | -80      | V           |
| Emitter-base voltage        | $V_{EBO}$ | -7       | V           |
| Collector current           | $I_C$     | -4       | A           |
|                             | $I_{CP}$  | -6       | A (Pulse) * |
| Collector power dissipation | $P_C$     | 2        | W (Ta=25°C) |
|                             |           | 30       | W (Tc=25°C) |
| Junction temperature        | $T_J$     | 150      | °C          |
| Storage temperature         | $T_{stg}$ | -55~+150 | °C          |

\* Single pulse.  $P_w = 100\text{ms}$ 

#### ●Packaging specifications and hFE

|                              |          |
|------------------------------|----------|
| Type                         | 2SB1616  |
| Package                      | TO-220FP |
| $h_{FE}$                     | 1k~10k   |
| Code                         | —        |
| Basic ordering unit (pieces) | 500      |

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| Parameter                   | Symbol    | Limits   | Unit        |
|-----------------------------|-----------|----------|-------------|
| Collector-base voltage      | $V_{CBO}$ | 80       | V           |
| Collector-emitter voltage   | $V_{CEO}$ | 80       | V           |
| Emitter-base voltage        | $V_{EBO}$ | 7        | V           |
| Collector current           | $I_C$     | 4        | A (DC)      |
|                             | $I_{CP}$  | 6        | A (t=100ms) |
| Collector power dissipation | $P_C$     | 2        | W           |
|                             |           | 30       | W (Tc=25°C) |
| Junction temperature        | $T_J$     | 150      | °C          |
| Storage temperature         | $T_{stg}$ | -55~+150 | °C          |

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