

TOSHIBA TRANSISTOR SILICON NPN TRIPLE DIFFUSED TYPE

**2SD1411A**

HIGH CURRENT SWITCHING APPLICATIONS

POWER AMPLIFIER APPLICATIONS

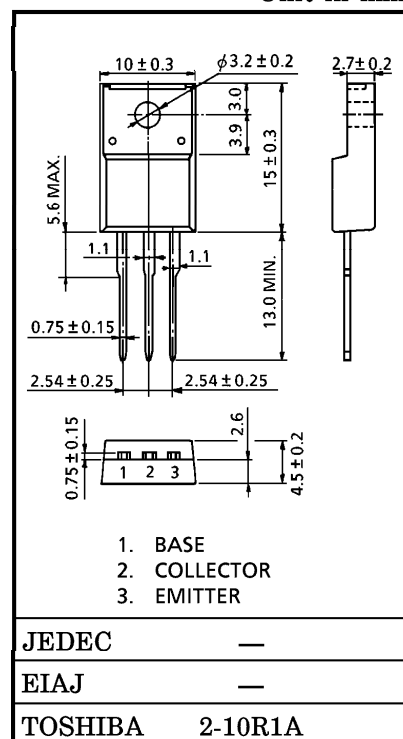
INDUSTRIAL APPLICATIONS

Unit in mm

- Low Saturation Voltage :  $V_{CE(sat)} = 0.5V$  (Max.) at  $I_C = 4A$
- Complementary to 2SB1018A

MAXIMUM RATINGS ( $T_a = 25^\circ C$ )

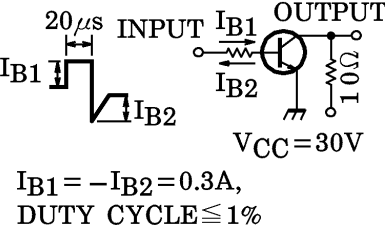
| CHARACTERISTIC                 |                    | SYMBOL    | RATING         | UNIT       |
|--------------------------------|--------------------|-----------|----------------|------------|
| Collector-Base Voltage         |                    | $V_{CBO}$ | 100            | V          |
| Collector-Emitter Voltage      |                    | $V_{CEO}$ | 80             | V          |
| Emitter-Base Voltage           |                    | $V_{EBO}$ | 5              | V          |
| Collector Current              |                    | $I_C$     | 7              | A          |
| Base Current                   |                    | $I_B$     | 1              | A          |
| Collector Power<br>Dissipation | $T_a = 25^\circ C$ | $P_C$     | 2.0            | W          |
|                                | $T_c = 25^\circ C$ |           | 30             |            |
| Junction Temperature           |                    | $T_j$     | 150            | $^\circ C$ |
| Storage Temperature Range      |                    | $T_{stg}$ | $-55 \sim 150$ | $^\circ C$ |



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## ELECTRICAL CHARACTERISTICS (Ta = 25°C)

| CHARACTERISTIC                       |                       | SYMBOL        | TEST CONDITION                                                                                                                                                                                                                                                                                                                      | MIN. | TYP. | MAX. | UNIT    |
|--------------------------------------|-----------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|------|------|---------|
| Collector Cut-off Current            |                       | $I_{CBO}$     | $V_{CB}=100V, I_E=0$                                                                                                                                                                                                                                                                                                                | —    | —    | 5    | $\mu A$ |
| Emitter Cut-off Current              |                       | $I_{EBO}$     | $V_{EB}=5V, I_C=0$                                                                                                                                                                                                                                                                                                                  | —    | —    | 5    | $\mu A$ |
| Collector-Emitter Breakdown Voltage  |                       | $V_{(BR)CEO}$ | $I_C=50mA, I_B=0$                                                                                                                                                                                                                                                                                                                   | 80   | —    | —    | V       |
| DC Current Gain                      | $h_{FE(1)}$<br>(Note) |               | $V_{CE}=1V, I_C=1A$                                                                                                                                                                                                                                                                                                                 | 70   | —    | 240  |         |
|                                      | $h_{FE(2)}$           |               | $V_{CE}=1V, I_C=4A$                                                                                                                                                                                                                                                                                                                 | 30   | —    | —    |         |
| Collector-Emitter Saturation Voltage |                       | $V_{CE(sat)}$ | $I_C=4A, I_B=0.4A$                                                                                                                                                                                                                                                                                                                  | —    | 0.25 | 0.5  | V       |
| Base-Emitter Saturation Voltage      |                       | $V_{BE(sat)}$ | $I_C=4A, I_B=0.4A$                                                                                                                                                                                                                                                                                                                  | —    | 0.9  | 1.4  | V       |
| Transition Frequency                 |                       | $f_T$         | $V_{CE}=4V, I_C=1A$                                                                                                                                                                                                                                                                                                                 | —    | 10   | —    | MHz     |
| Collector Output Capacitance         |                       | $C_{ob}$      | $V_{CB}=10V, I_E=0, f=1MHz$                                                                                                                                                                                                                                                                                                         | —    | 200  | —    | pF      |
| Switching Time                       | Turn-on Time          | $t_{on}$      |  <p>20 <math>\mu s</math> INPUT <math>I_{B1}</math> OUTPUT<br/> <math>I_{B1}</math> <math>I_{B2}</math> 10 <math>\Omega</math><br/> <math>V_{CC}=30V</math><br/> <math>I_{B1} = -I_{B2} = 0.3A</math>,<br/> DUTY CYCLE <math>\leq 1\%</math></p> | —    | 0.4  | —    | $\mu s$ |
|                                      | Storage Time          | $t_{stg}$     |                                                                                                                                                                                                                                                                                                                                     | —    | 2.5  | —    |         |
|                                      | Fall Time             | $t_f$         |                                                                                                                                                                                                                                                                                                                                     | —    | 0.5  | —    |         |

(Note)  $h_{FE(1)}$  Classification    O : 70~140,    Y : 120~240

