

TOSHIBA TRANSISTOR SILICON NPN TRIPLE DIFFUSED TYPE

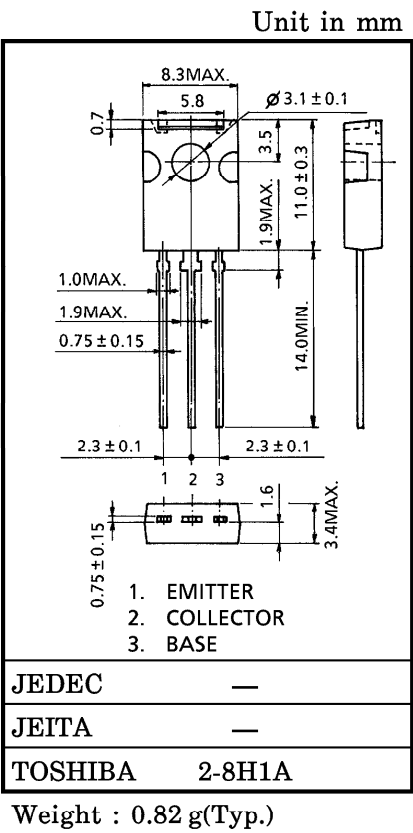
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SWITCHING REGULATOR APPLICATIONS  
HIGH VOLTAGE SWITCHING APPLICATIONS  
DC-DC CONVERTER APPLICATIONS

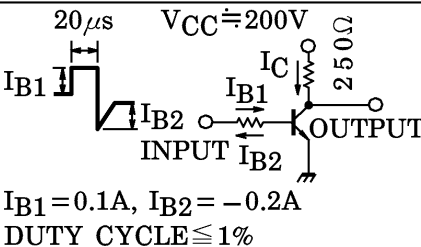
- High Speed :  $t_r=0.5\mu s$  (Max.),  $t_f=0.3\mu s$  (Max.)  
( $I_C=0.8A$ )
- High Collector Breakdown Voltage :  $V_{CEO}=450V$
- High DC Current Gain :  $h_{FE}=20$  (Min.) ( $I_C=0.3A$ )

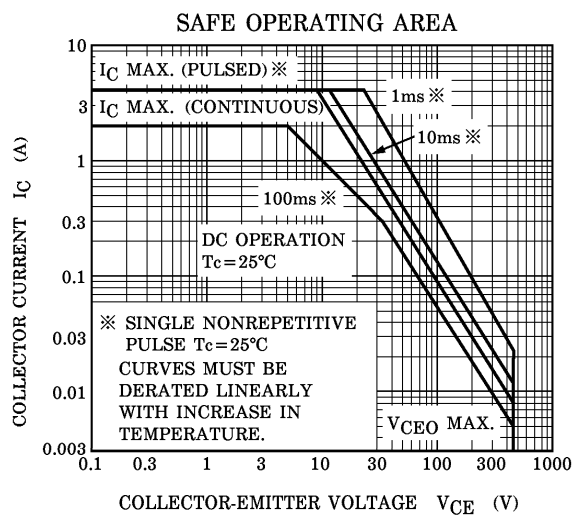
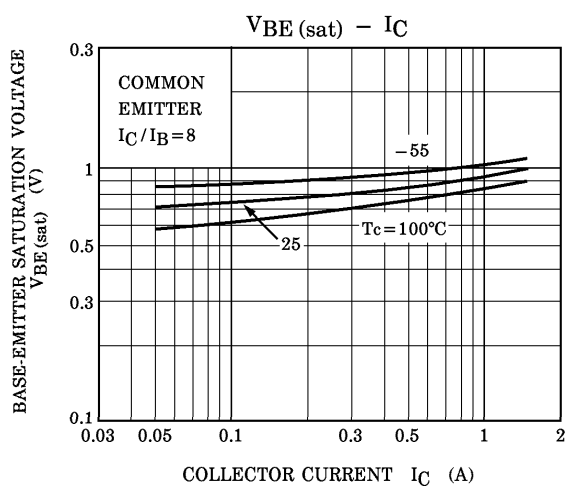
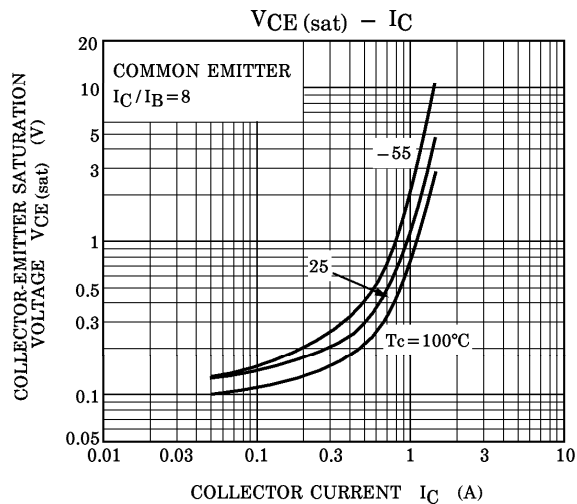
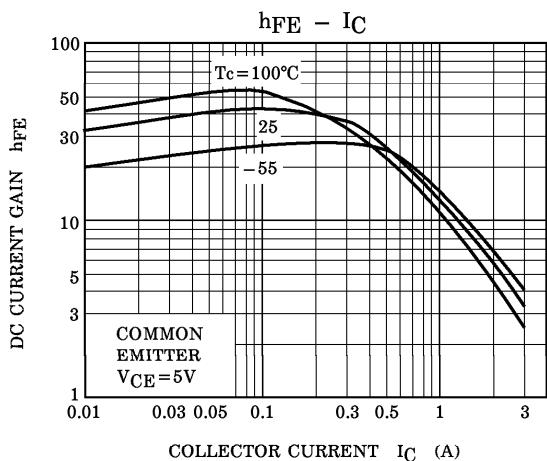
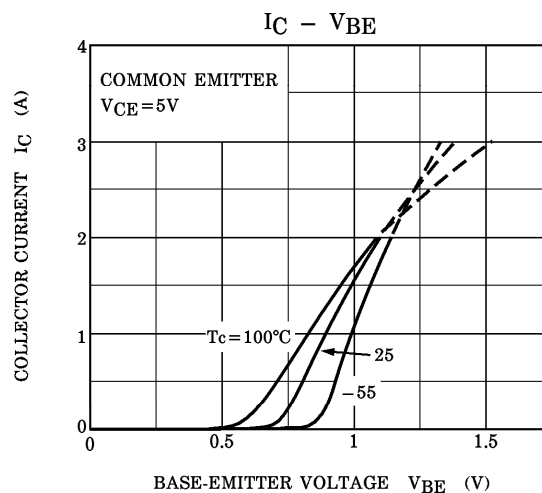
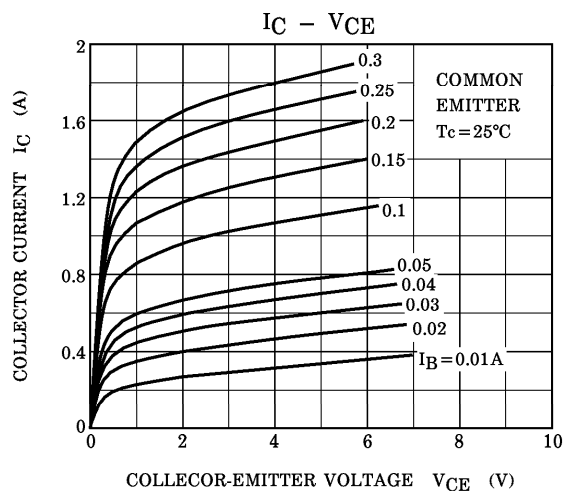
MAXIMUM RATINGS (Tc = 25°C)

| CHARACTERISTIC              |                   | SYMBOL    | RATING  | UNIT |
|-----------------------------|-------------------|-----------|---------|------|
| Collector-Base Voltage      |                   | $V_{CB0}$ | 650     | V    |
| Collector-Emitter Voltage   |                   | $V_{CE0}$ | 450     | V    |
| Emitter-Base Voltage        |                   | $V_{EB0}$ | 7       | V    |
| Collector Current           | DC                | $I_C$     | 2       | A    |
|                             | Pulse             | $I_{CP}$  | 4       |      |
| Base Current                |                   | $I_B$     | 0.5     | A    |
| Collector Power Dissipation | $T_a=25^{\circ}C$ | $P_C$     | 1.5     | W    |
|                             | $T_c=25^{\circ}C$ |           | 10      |      |
| Junction Temperature        |                   | $T_j$     | 150     | °C   |
| Storage Temperature Range   |                   | $T_{stg}$ | -55~150 | °C   |



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

| CHARACTERISTIC                       |              | SYMBOL         | TEST CONDITION                                                                                                                                                                                                                                                                                                                                                                                                                 | MIN. | TYP. | MAX. | UNIT          |
|--------------------------------------|--------------|----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|------|------|---------------|
| Collector Cut-off Current            |              | $I_{CBO}$      | $V_{CB} = 520\text{V}$ , $I_E = 0$                                                                                                                                                                                                                                                                                                                                                                                             | —    | —    | 20   | $\mu\text{A}$ |
| Emitter Cut-off Current              |              | $I_{EBO}$      | $V_{EB} = 7\text{V}$ , $I_C = 0$                                                                                                                                                                                                                                                                                                                                                                                               | —    | —    | 10   | $\mu\text{A}$ |
| Collector-Base Breakdown Voltage     |              | $V_{(BR) CBO}$ | $I_C = 1\text{mA}$ , $I_E = 0$                                                                                                                                                                                                                                                                                                                                                                                                 | 650  | —    | —    | V             |
| Collector-Emitter Breakdown Voltage  |              | $V_{(BR) CEO}$ | $I_E = 10\text{mA}$ , $I_B = 0$                                                                                                                                                                                                                                                                                                                                                                                                | 450  | —    | —    | V             |
| DC Current Gain                      |              | $h_{FE} (1)$   | $V_{CE} = 5\text{V}$ , $I_C = 1\text{mA}$                                                                                                                                                                                                                                                                                                                                                                                      | 13   | —    | —    | —             |
|                                      |              | $h_{FE} (2)$   | $V_{CE} = 5\text{V}$ , $I_C = 0.2\text{A}$                                                                                                                                                                                                                                                                                                                                                                                     | 20   | —    | 65   |               |
| Collector-Emitter Saturation Voltage |              | $V_{CE (sat)}$ | $I_C = 0.8\text{A}$ , $I_B = 0.1\text{A}$                                                                                                                                                                                                                                                                                                                                                                                      | —    | —    | 1.0  | V             |
| Base-Emitter Saturation Voltage      |              | $V_{BE (sat)}$ | $I_C = 0.8\text{A}$ , $I_B = 0.1\text{A}$                                                                                                                                                                                                                                                                                                                                                                                      | —    | —    | 1.3  | V             |
| Switching Time                       | Rise Time    | $t_r$          |  <p> <math>20\mu\text{s}</math> <math>V_{CC} = 200\text{V}</math><br/> <math>I_{B1}</math> <math>I_C</math> <math>250\Omega</math><br/> <math>I_{B2}</math> INPUT OUTPUT<br/> <math>I_{B1}</math> <math>I_{B2}</math><br/> <math>I_{B1} = 0.1\text{A}</math>, <math>I_{B2} = -0.2\text{A}</math><br/> DUTY CYCLE <math>\leq 1\%</math> </p> | —    | —    | 0.5  | $\mu\text{s}$ |
|                                      | Storage Time | $t_{stg}$      |                                                                                                                                                                                                                                                                                                                                                                                                                                | —    | —    | 2.0  |               |
|                                      | Fall Time    | $t_f$          |                                                                                                                                                                                                                                                                                                                                                                                                                                | —    | —    | 0.3  |               |



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