

TOSHIBA TRANSISTOR SILICON NPN TRIPLE DIFFUSED TYPE

# 2SD1313

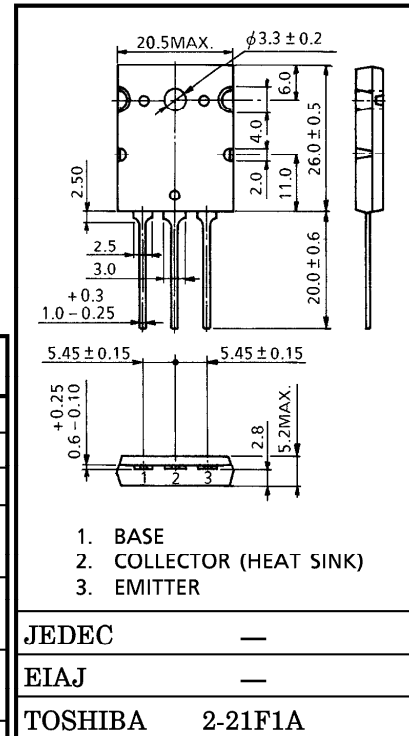
HIGH POWER AMPLIFIER APPLICATIONS.  
HIGH POWER SWITCHING APPLICATIONS.

INDUSTRIAL APPLICATIONS  
Unit in mm

- High Power Dissipation :  $P_C=200W$  ( $T_c=25^\circ C$ )
- High Collector Current :  $I_C=25A$  (DC)
- High Speed Switching :  $t_f=0.5\mu s$  (Typ.) ( $I_C=15A$ )
- Low Saturation Voltage :  $V_{CE(sat)}=1.0V$  (Max.) ( $I_C=15A$ )

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

| CHARACTERISTIC                                      | SYMBOL    | RATING   | UNIT       |
|---|-----------|----------|------------|
| Collector-Base Voltage                              | $V_{CB0}$ | 800      | V          |
| Collector-Emitter Voltage                           | $V_{CEO}$ | 350      | V          |
| Emitter-Base Voltage                                | $V_{EBO}$ | 7        | V          |
| Collector Current                                   | DC        | $I_C$    | 25         |
|   | Pulse     | $I_{CP}$ | 35         |
| Base Current  | DC        | $I_B$    | 10         |
|   | Pulse     | $I_{BP}$ | 15         |
| Collector Power Dissipation<br>( $T_c=25^\circ C$ ) | $P_C$     | 200      | W          |
| Junction Temperature                                | $T_j$     | 150      | $^\circ C$ |
| Storage Temperature Range                           | $T_{stg}$ | -55~150  | $^\circ C$ |



Weight : 9.75g (Typ.)

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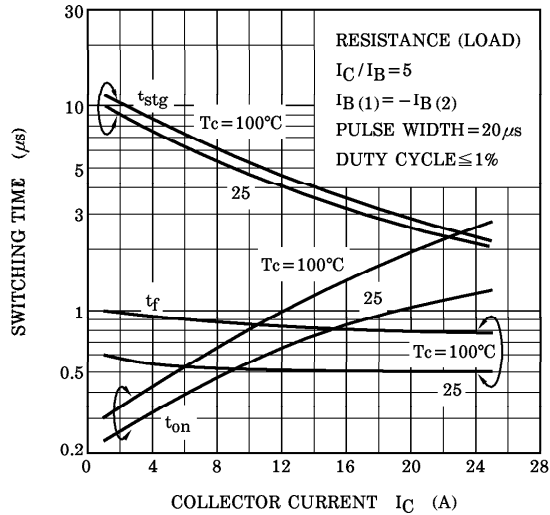
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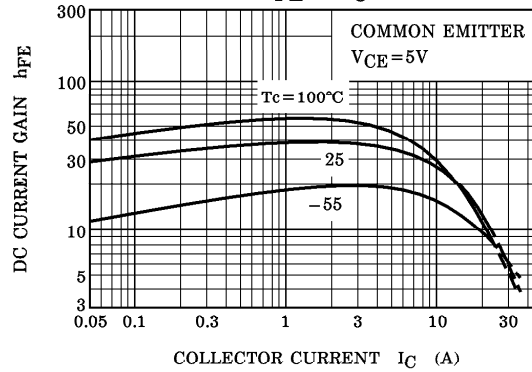
ELECTRICAL CHARACTERISTICS (Ta = 25°C)

| CHARACTERISTIC                       |              | SYMBOL                | TEST CONDITION   | MIN. | TYP. | MAX. | UNIT |
|--------------------------------------|--------------|-----------------------|--|------|------|------|------|
| Collector Cut-off Current            |              | ICBO                  | V <sub>CB</sub> = 800V, I <sub>E</sub> = 0   | —    | —    | 1    | mA   |
| Emitter Cut-off Current              |              | IEBO                  | V <sub>EB</sub> = 7V, I <sub>C</sub> = 0   | —    | —    | 1    | mA   |
| Collector-Emitter Breakdown Voltage  |              | V (BR) CEO            | I <sub>C</sub> = 10mA, I <sub>B</sub> = 0  | 350  | —    | —    | V    |
| DC Current Gain                      |              | h <sub>FE</sub> (1)   | V <sub>CE</sub> = 5V, I <sub>C</sub> = 1A  | 15   | —    | —    |      |
|                                      |              | h <sub>FE</sub> (2)   | V <sub>CE</sub> = 5V, I <sub>C</sub> = 25A   | 6    | —    | —    |      |
| Collector-Emitter Saturation Voltage |              | V <sub>CE</sub> (sat) | I <sub>C</sub> = 15A, I <sub>B</sub> = 3A  | —    | —    | 1.0  | V    |
| Base-Emitter Saturation Voltage      |              | V <sub>BE</sub> (sat) | I <sub>C</sub> = 15A, I <sub>B</sub> = 3A  | —    | —    | 1.7  | V    |
| Collector Output Capacitance         |              | C <sub>ob</sub>       | V <sub>CB</sub> = 50V, I <sub>E</sub> = 0, f = 1MHz  | —    | 170  | —    | pF   |
| Transition Frequency                 |              | f <sub>T</sub>        | V <sub>CE</sub> = 10V, I <sub>C</sub> = 1A   | —    | 6    | —    | MHz  |
| Switching Time                       | Turn-on Time | t <sub>on</sub>       | <p>V<sub>CC</sub> = 200V<br/> <math>I_C</math><br/> <math>I_{B1}</math> INPUT <math>I_{B1}</math><br/> <math>I_{B2}</math> <math>I_{B2}</math><br/>         OUTPUT<br/> <math>I_C = 15A, I_{B1} = -I_{B2} = 3A,</math><br/>         DUTY CYCLE &lt; 1%</p> | —    | 0.8  | —    | μs   |
|                                      | Storage Time | t <sub>stg</sub>      |  | —    | 3.0  | —    |      |
|                                      | Fall Time    | t <sub>f</sub>        |  | —    | —    | 0.5  |      |

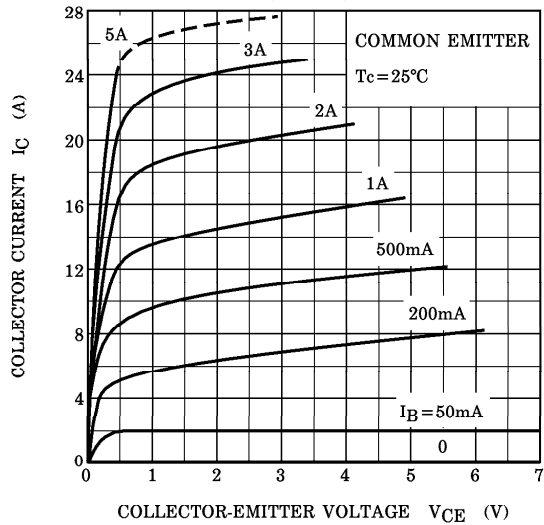
**SWITCHING APPLICATIONS**



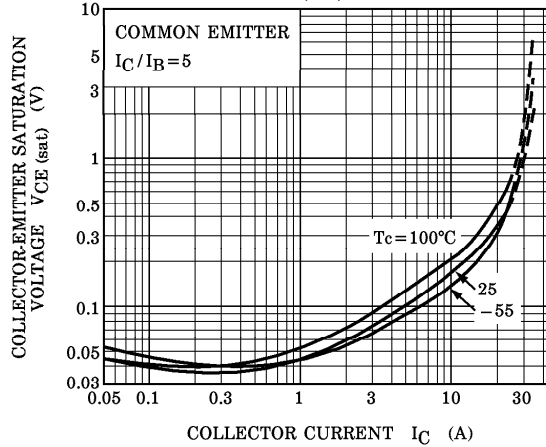
**hFE -  $I_C$**



**$I_C - V_{CE}$**



**$V_{CE}(\text{sat}) - I_C$**



**$V_{BE}(\text{sat}) - I_C$**

