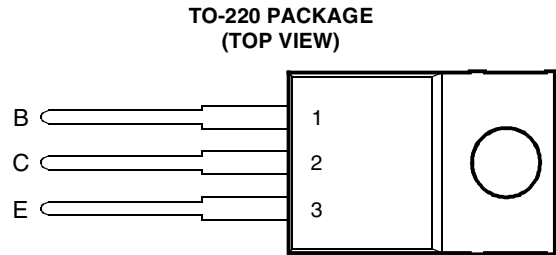




- 80 W at 25°C Case Temperature
- 7 A Continuous Collector Current
- 10 A Peak Collector Current
- Maximum  $V_{CE(sat)}$  of 2 V at  $I_C = 5$  A
- $I_{CEX(sus)}$  7 A at rated  $V_{(BR)CEO}$



Pin 2 is in electrical contact with the mounting base.

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**absolute maximum ratings at 25°C case temperature (unless otherwise noted)**

| RATING                                                                             |        | SYMBOL    | VALUE       | UNIT |
|------------------------------------------------------------------------------------|--------|-----------|-------------|------|
| Collector-base voltage ( $I_E = 0$ )                                               | TIP150 | $V_{CBO}$ | 300         | V    |
|                                                                                    | TIP151 |           | 350         |      |
|                                                                                    | TIP152 |           | 400         |      |
| Collector-emitter voltage ( $I_B = 0$ )                                            | TIP150 | $V_{CEO}$ | 300         | V    |
|                                                                                    | TIP151 |           | 350         |      |
|                                                                                    | TIP152 |           | 400         |      |
| Emitter-base voltage                                                               |        | $V_{EBO}$ | 8           | V    |
| Continuous collector current                                                       |        | $I_C$     | 7           | A    |
| Peak collector current (see Note 1)                                                |        | $I_{CM}$  | 10          | A    |
| Continuous base current                                                            |        | $I_B$     | 1.5         | A    |
| Continuous device dissipation at (or below) 25°C case temperature (see Note 2)     |        | $P_{tot}$ | 80          | W    |
| Continuous device dissipation at (or below) 25°C free air temperature (see Note 3) |        | $P_{tot}$ | 2           | W    |
| Operating junction temperature range                                               |        | $T_j$     | -65 to +150 | °C   |
| Storage temperature range                                                          |        | $T_{stg}$ | -65 to +150 | °C   |
| Lead temperature 3.2 mm from case for 10 seconds                                   |        | $T_L$     | 260         | °C   |

NOTES: 1. This value applies for  $t_p \leq 5$  ms, duty cycle  $\leq 10\%$ .  
2. Derate linearly to 150°C case temperature at the rate of 0.64 W/°C.  
3. Derate linearly to 150°C free air temperature at the rate of 16 mW/°C.

**PRODUCT INFORMATION**

**electrical characteristics at 25°C case temperature**

| PARAMETER                                              | TEST CONDITIONS                                                                  |                                                                     |                            | MIN               | TYP | MAX               | UNIT          |
|--------------------------------------------------------|----------------------------------------------------------------------------------|---------------------------------------------------------------------|----------------------------|-------------------|-----|-------------------|---------------|
| $V_{(BR)CBO}$ Collector-base breakdown voltage         | $I_C = 1 \text{ mA}$                                                             | $I_E = 0$                                                           | TIP150<br>TIP151<br>TIP152 | 300<br>350<br>400 |     |                   | V             |
| $V_{(BR)CEO}$ Collector-emitter breakdown voltage      | $I_C = 10 \text{ mA}$<br>(see Note 4)                                            | $I_B = 0$                                                           | TIP150<br>TIP151<br>TIP152 | 300<br>350<br>400 |     |                   | V             |
| $I_{CEO}$ Collector-emitter cut-off current            | $V_{CE} = 300 \text{ V}$<br>$V_{CE} = 350 \text{ V}$<br>$V_{CE} = 400 \text{ V}$ | $I_B = 0$<br>$I_B = 0$<br>$I_B = 0$                                 | TIP150<br>TIP151<br>TIP152 |                   |     | 250<br>250<br>250 | $\mu\text{A}$ |
| $I_{CEX(sus)}$ Collector-emitter sustaining current    | $V_{CLAMP} = V_{(BR)CEO}$                                                        |                                                                     |                            | 7                 |     |                   | A             |
| $I_{EBO}$ Emitter cut-off current                      | $V_{EB} = 8 \text{ V}$                                                           | $I_C = 0$                                                           |                            |                   |     | 15                | mA            |
| $h_{FE}$ Forward current transfer ratio                | $V_{CE} = 5 \text{ V}$<br>$V_{CE} = 5 \text{ V}$<br>$V_{CE} = 5 \text{ V}$       | $I_C = 2.5 \text{ A}$<br>$I_C = 5 \text{ A}$<br>$I_C = 7 \text{ A}$ | (see Notes 4 and 5)        | 150<br>50<br>15   |     |                   |               |
| $V_{CE(sat)}$ Collector-emitter saturation voltage     | $I_B = 10 \text{ mA}$<br>$I_B = 100 \text{ mA}$<br>$I_B = 250 \text{ mA}$        | $I_C = 1 \text{ A}$<br>$I_C = 2 \text{ A}$<br>$I_C = 5 \text{ A}$   | (see Notes 4 and 5)        |                   |     | 1.5<br>1.5<br>2   | V             |
| $V_{BE(sat)}$ Base-emitter saturation voltage          | $I_B = 100 \text{ mA}$<br>$I_B = 250 \text{ mA}$                                 | $I_C = 2 \text{ A}$<br>$I_C = 5 \text{ A}$                          | (see Notes 4 and 5)        |                   |     | 2.2<br>2.3        | V             |
| $V_{EC}$ Parallel diode forward voltage                | $I_E = 7 \text{ A}$                                                              | $I_B = 0$                                                           | (see Notes 4 and 5)        |                   |     | 3.5               | V             |
| $h_{fe}$ Small signal forward current transfer ratio   | $V_{CE} = 5 \text{ V}$                                                           | $I_C = 0.5 \text{ A}$                                               | $f = 1 \text{ kHz}$        | 200               |     |                   |               |
| $ h_{fe} $ Small signal forward current transfer ratio | $V_{CE} = 5 \text{ V}$                                                           | $I_C = 0.5 \text{ A}$                                               | $f = 1 \text{ MHz}$        | 10                |     |                   |               |
| $C_{ob}$ Output capacitance                            | $V_{CB} = 10 \text{ V}$                                                          | $I_E = 0$                                                           | $f = 1 \text{ MHz}$        |                   |     | 100               | pF            |

NOTES: 4. These parameters must be measured using pulse techniques,  $t_p = 300 \mu\text{s}$ , duty cycle  $\leq 2\%$ .

5. These parameters must be measured using voltage-sensing contacts, separate from the current carrying contacts.

**thermal characteristics**

| PARAMETER                                               | MIN | TYP | MAX  | UNIT                        |
|---------------------------------------------------------|-----|-----|------|-----------------------------|
| $R_{\theta JC}$ Junction to case thermal resistance     |     |     | 1.56 | $^{\circ}\text{C/W}$        |
| $R_{\theta JA}$ Junction to free air thermal resistance |     |     | 62.5 | $^{\circ}\text{C/W}$        |
| $C_{\theta C}$ Thermal capacitance of case              |     | 0.9 |      | $\text{J}/^{\circ}\text{C}$ |

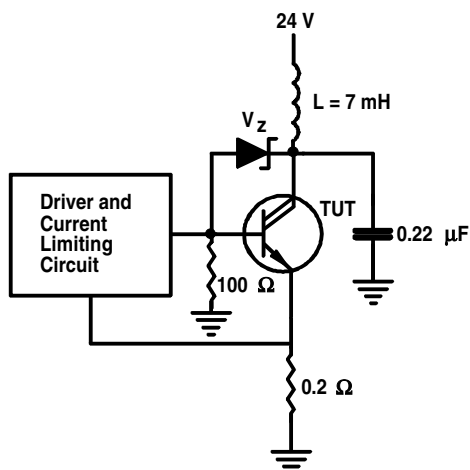
**inductive-load-switching characteristics at 25°C case temperature**

| PARAMETER                        | TEST CONDITIONS <sup>†</sup>                       |                              |                      | MIN | TYP | MAX | UNIT          |
|----------------------------------|----------------------------------------------------|------------------------------|----------------------|-----|-----|-----|---------------|
| $t_{sv}$ Voltage storage time    | $I_C = 5 \text{ A}$<br>$V_{(clamp)} = V_{(BR)CEO}$ | $I_{B(on)} = 250 \text{ mA}$ | $R_{BE} = 47 \Omega$ |     | 3.9 |     | $\mu\text{s}$ |
| $t_{si}$ Current storage time    |                                                    |                              |                      |     | 4.7 |     | $\mu\text{s}$ |
| $t_{rv}$ Voltage transition time |                                                    |                              |                      |     | 1.2 |     | $\mu\text{s}$ |
| $t_{ti}$ Current transition time |                                                    |                              |                      |     | 1.2 |     | $\mu\text{s}$ |
| $t_{xo}$ Cross-over time         |                                                    |                              |                      |     | 2.0 |     | $\mu\text{s}$ |

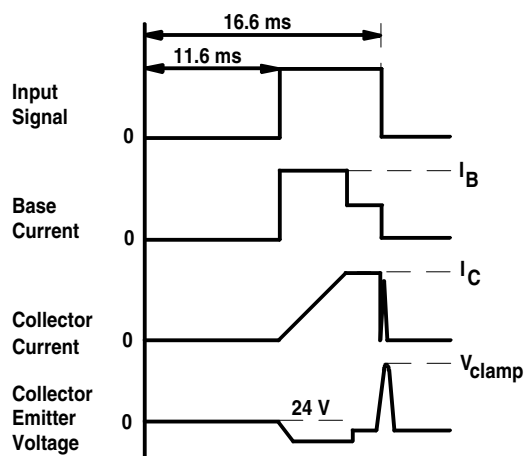
<sup>†</sup> Voltage and current values shown are nominal; exact values vary slightly with transistor parameters.

**PRODUCT INFORMATION**

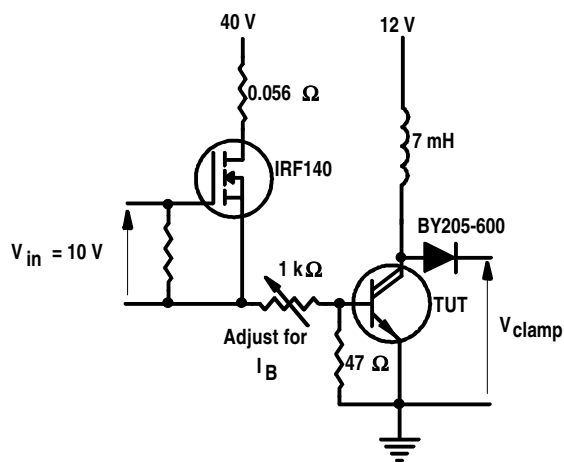
**PARAMETER MEASUREMENT INFORMATION**



**Figure 1. Functional Test Circuit**



**Figure 2. Functional Test Waveforms**



**Figure 3. Switching Test Circuit**

**PRODUCT INFORMATION**

TYPICAL CHARACTERISTICS

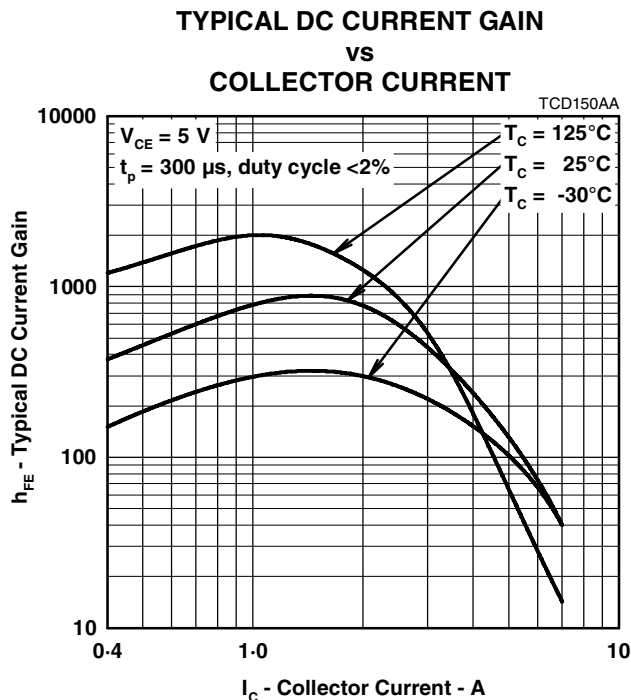


Figure 4.

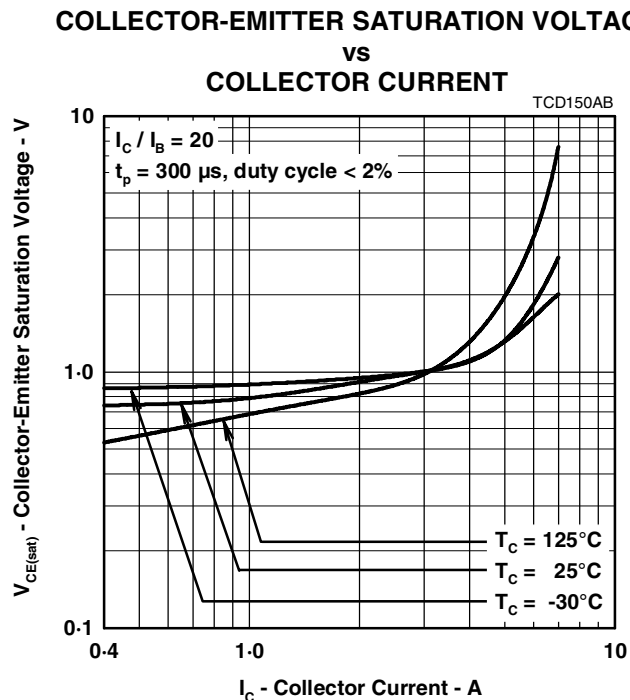


Figure 5.

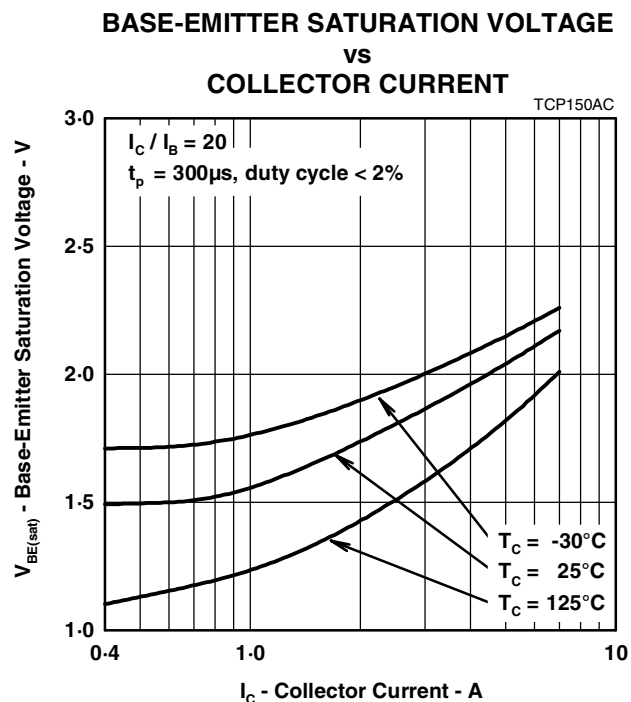


Figure 6.

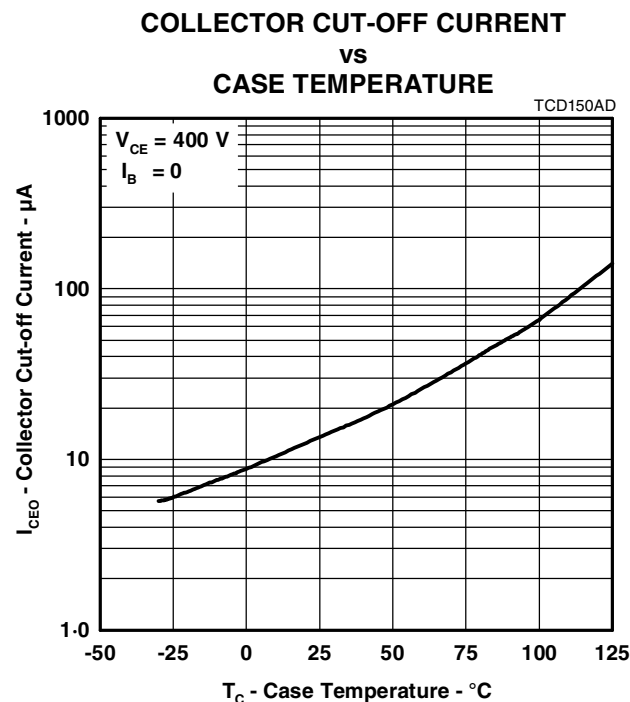


Figure 7.

**PRODUCT INFORMATION**

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**MAXIMUM SAFE OPERATING REGIONS**

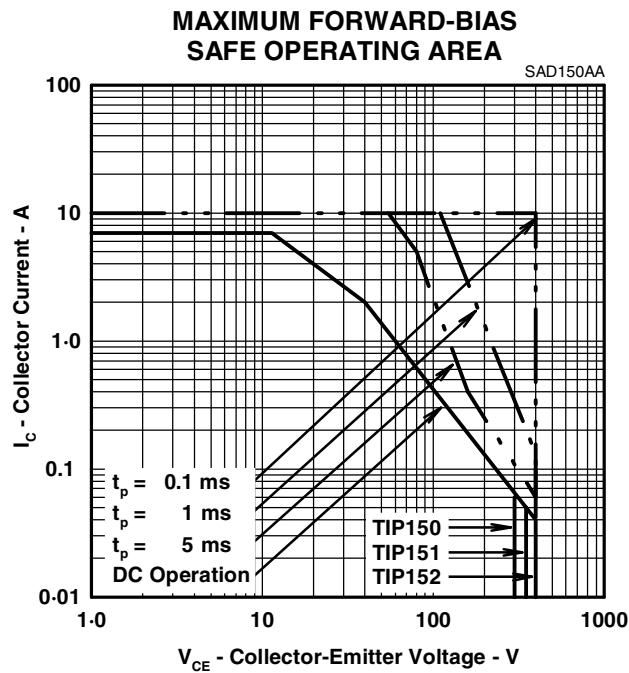


Figure 8.

**THERMAL INFORMATION**

**MAXIMUM POWER DISSIPATION  
vs  
CASE TEMPERATURE**

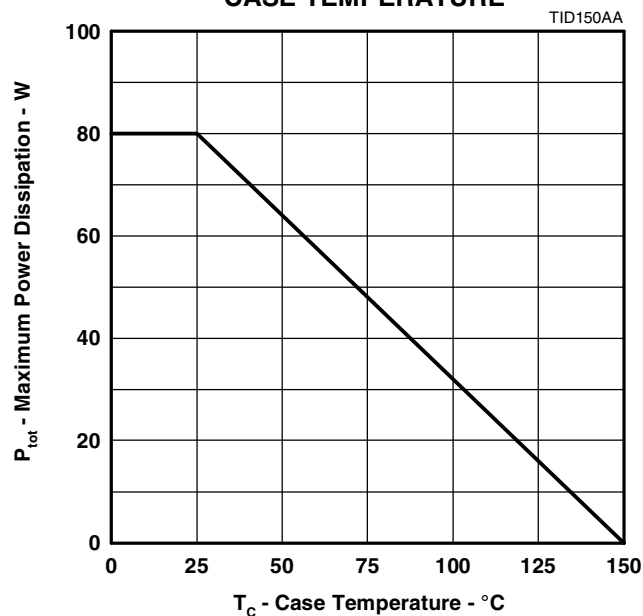


Figure 9.

**PRODUCT INFORMATION**

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