



## 2SA2040 / 2SC5707

### High Current Switching Applications

#### Applications

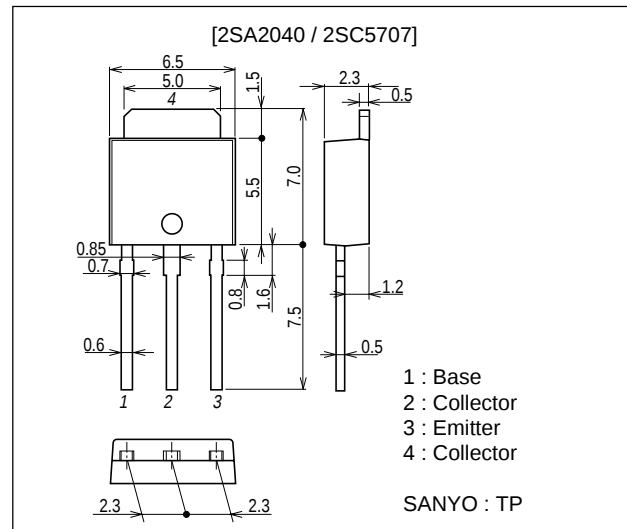
- DC-DC converter, relay drivers, lamp drivers, motor drivers, strobes.

#### Features

- Adoption of FBET, MBIT process.
- Large current capacitance.
- Low collector-to-emitter saturation voltage.
- High-speed switching.
- High allowable power dissipation.

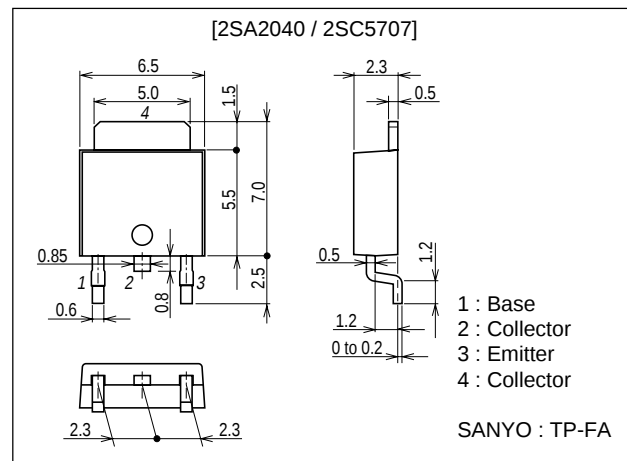
#### Package Dimensions

unit : mm  
2045B



#### Package Dimensions

unit : mm  
2044B



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## Specifications

Note\*( ) : 2SA2040

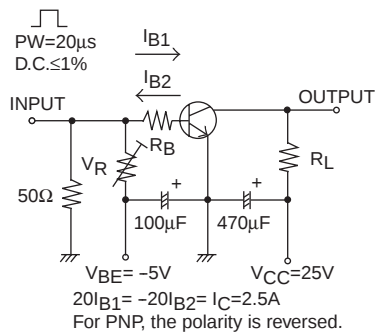
**Absolute Maximum Ratings** at  $T_a=25^\circ\text{C}$

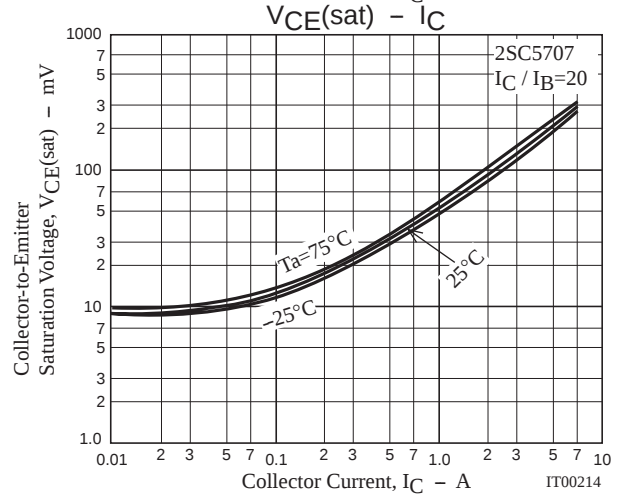
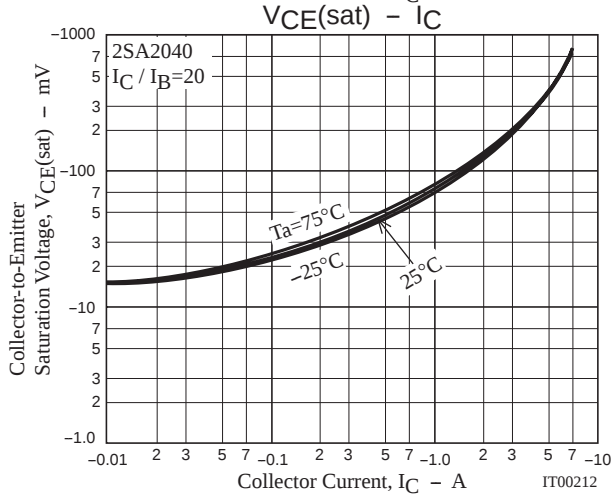
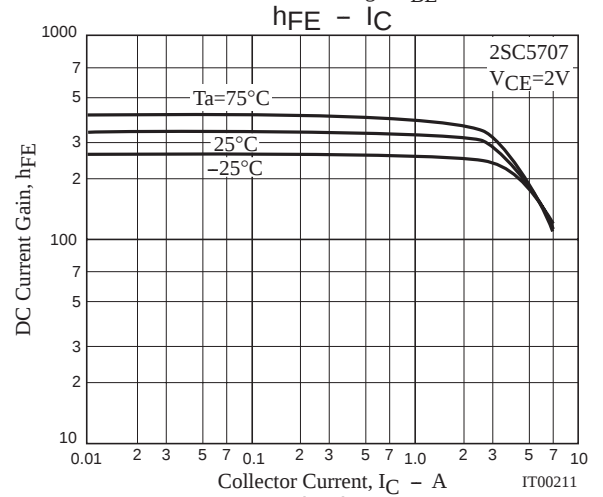
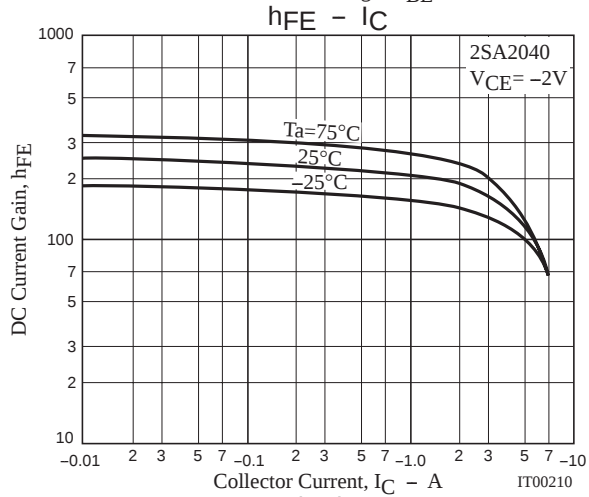
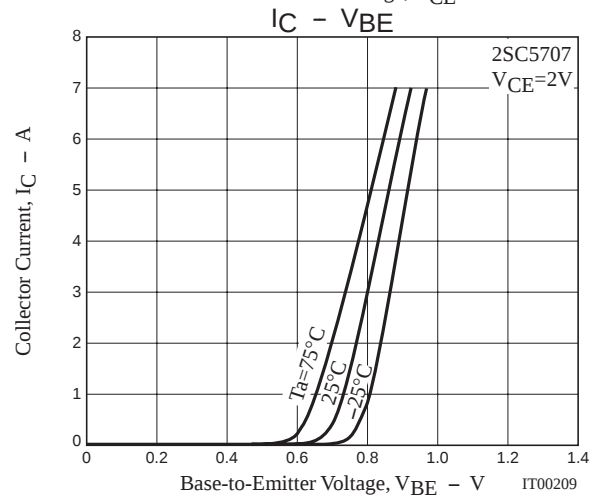
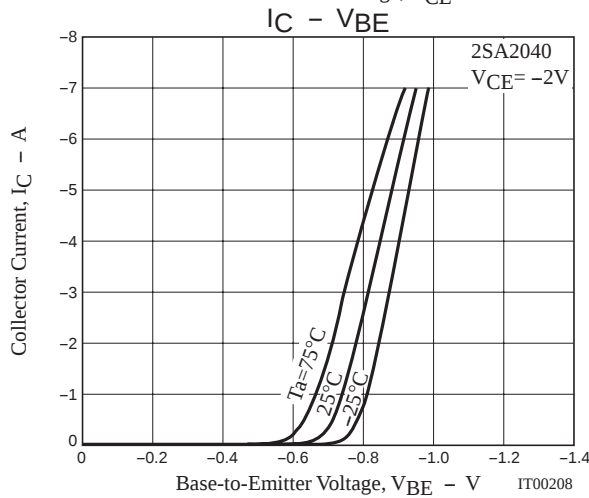
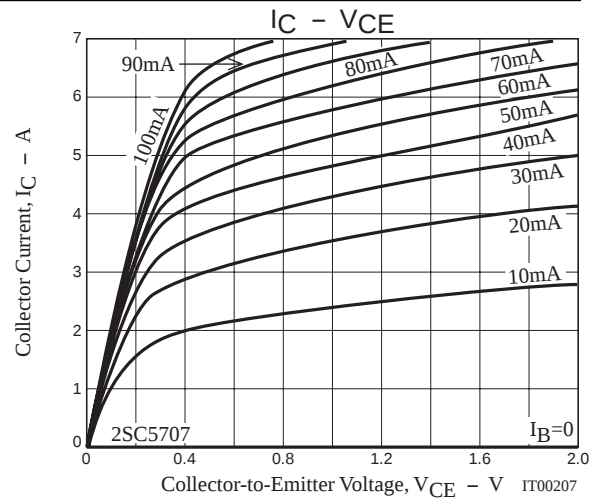
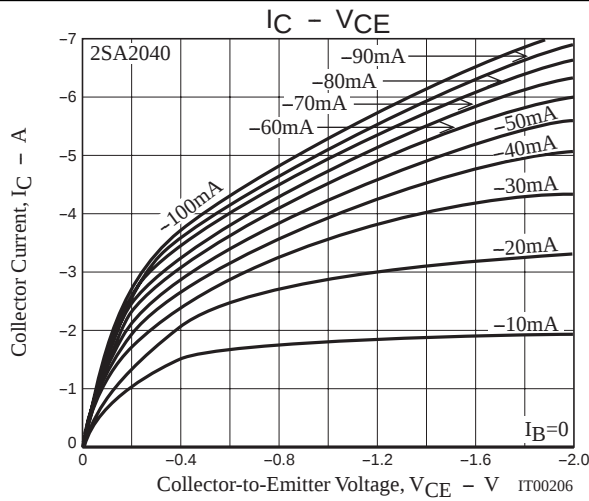
| Parameter                    | Symbol    | Conditions             | Ratings     | Unit             |
|------------------------------|-----------|------------------------|-------------|------------------|
| Collector-to-Base Voltage    | $V_{CB0}$ |                        | (-50)80     | V                |
| Collector-to-Emitter Voltage | $V_{CES}$ |                        | (-50)80     | V                |
| Collector-to-Emitter Voltage | $V_{CEO}$ |                        | (-)50       | V                |
| Emitter-to-Base Voltage      | $V_{EBO}$ |                        | (-)6        | V                |
| Collector Current            | $I_C$     |                        | (-)8        | A                |
| Collector Current (Pulse)    | $I_{CP}$  |                        | (-)11       | A                |
| Base Current                 | $I_B$     |                        | (-)2        | A                |
| Collector Dissipation        | $P_C$     |                        | 1.0         | W                |
|                              |           | $T_c=25^\circ\text{C}$ | 15          | W                |
| Junction Temperature         | $T_J$     |                        | 150         | $^\circ\text{C}$ |
| Storage Temperature          | $T_{stg}$ |                        | -55 to +150 | $^\circ\text{C}$ |

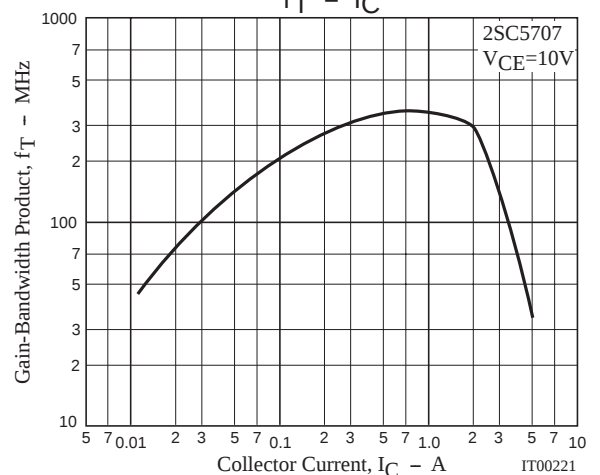
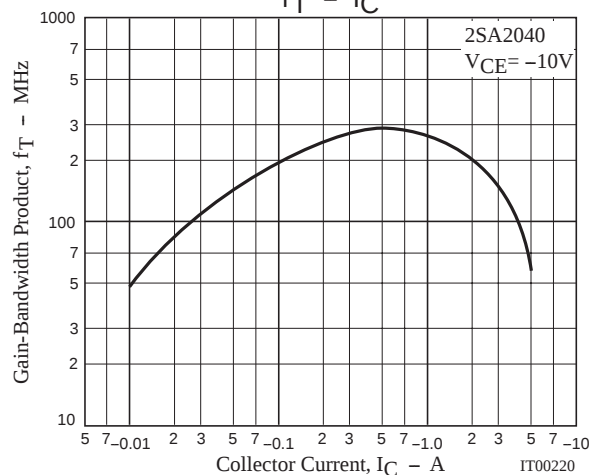
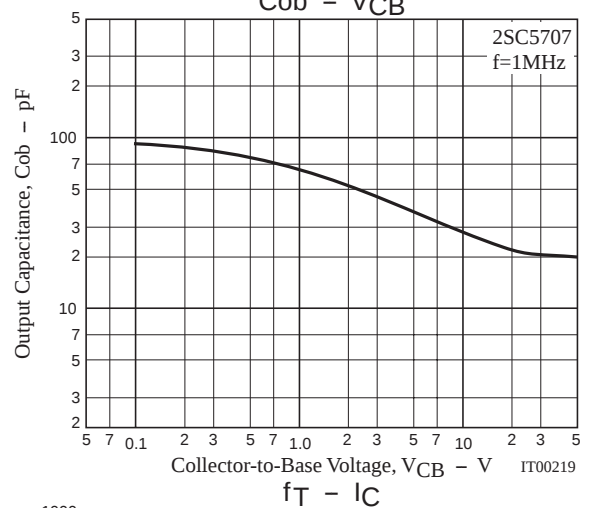
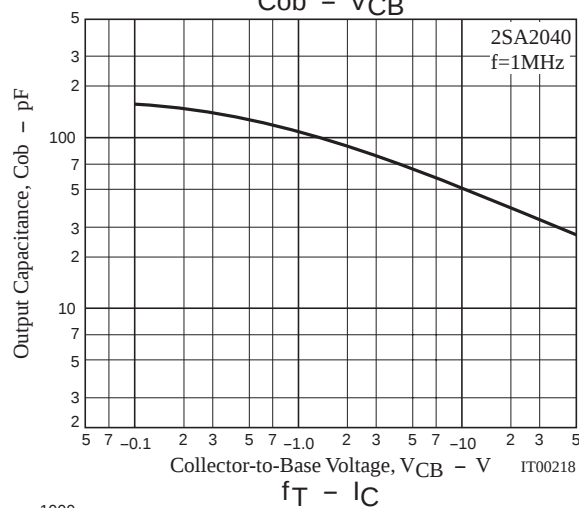
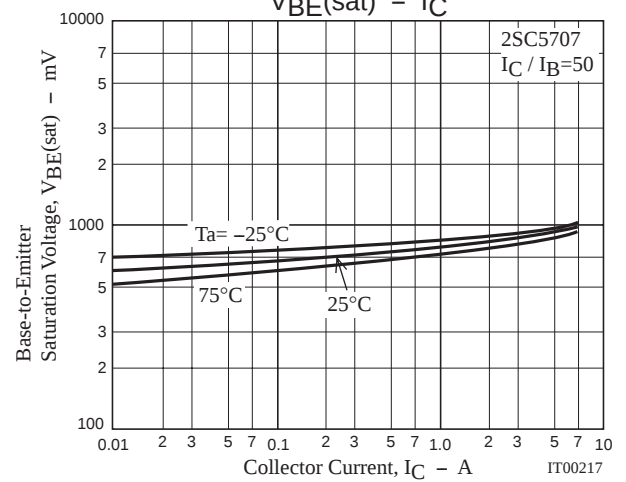
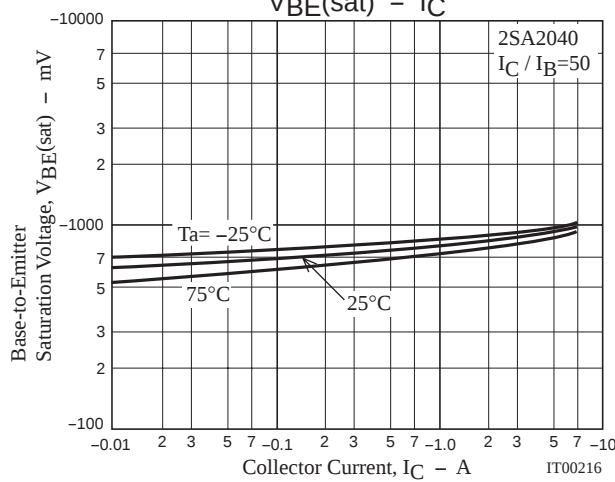
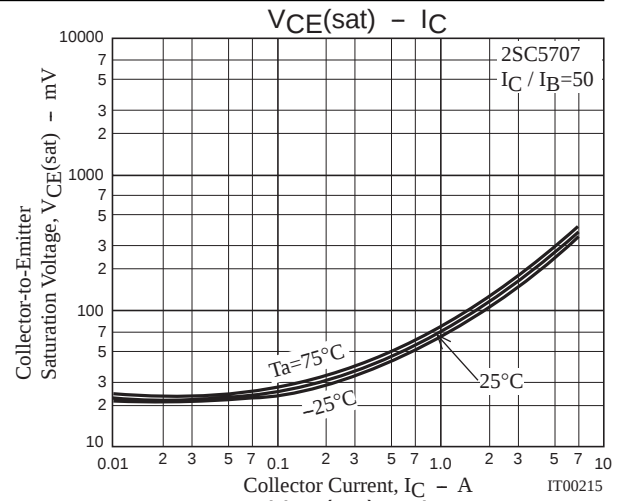
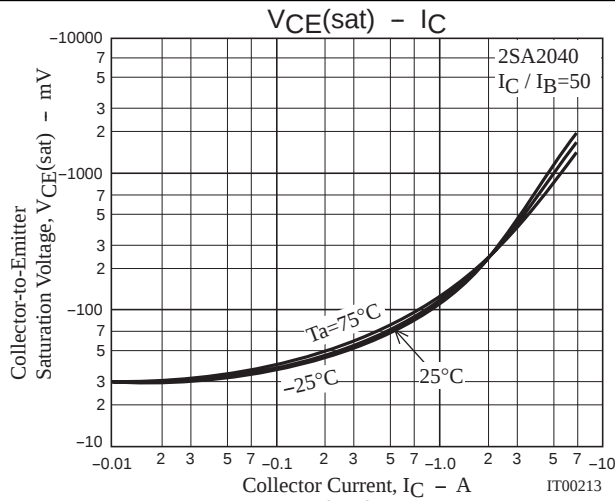
**Electrical Characteristics** at  $T_a=25^\circ\text{C}$

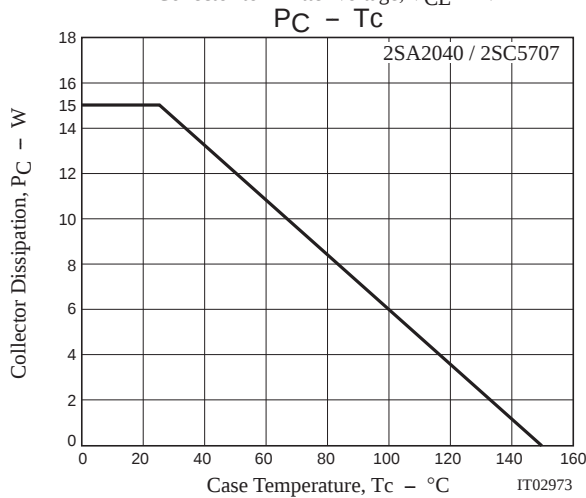
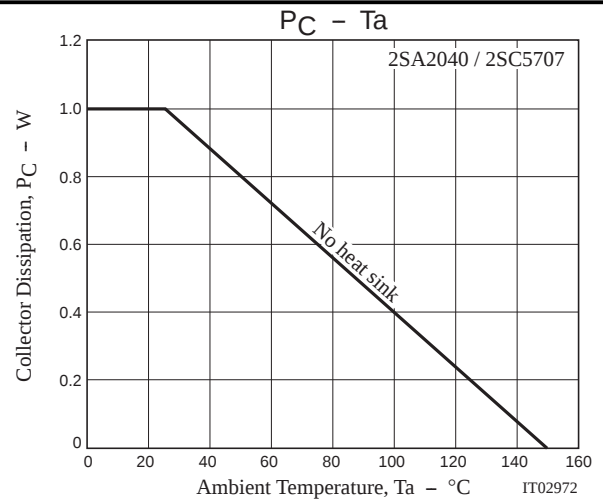
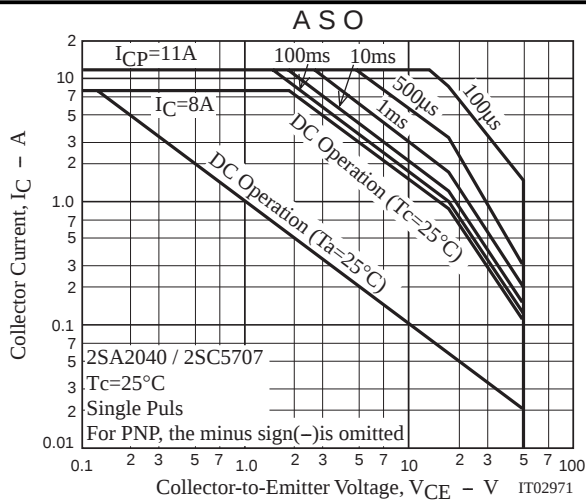
| Parameter                               | Symbol        | Conditions                                     | Ratings |           |           | Unit          |
|-----------------------------------------|---------------|------------------------------------------------|---------|-----------|-----------|---------------|
|                                         |               |                                                | min     | typ       | max       |               |
| Collector Cutoff Current                | $I_{CBO}$     | $V_{CB}=(-)40\text{V}$ , $I_E=0$               |         |           | (-)0.1    | $\mu\text{A}$ |
| Emitter Cutoff Current                  | $I_{EBO}$     | $V_{EB}=(-)4\text{V}$ , $I_C=0$                |         |           | (-)0.1    | $\mu\text{A}$ |
| DC Current Gain                         | $h_{FE}$      | $V_{CE}=(-)2\text{V}$ , $I_C=(-)500\text{mA}$  | 200     |           | 560       |               |
| Gain-Bandwidth Product                  | $f_T$         | $V_{CE}=(-)10\text{V}$ , $I_C=(-)500\text{mA}$ |         | (290)330  |           | MHz           |
| Output Capacitance                      | $C_{ob}$      | $V_{CB}=(-)10\text{V}$ , $f=1\text{MHz}$       |         | (50)28    |           | pF            |
| Collector-to-Emitter Saturation Voltage | $V_{CE(sat)}$ | $I_C=(-)3.5\text{A}$ , $I_B=(-)175\text{mA}$   |         | (-230)160 | (-390)240 | mV            |
|                                         |               | $I_C=(-)2\text{A}$ , $I_B=(-)40\text{mA}$      |         | (-240)110 | (-400)170 | mV            |
| Base-to-Emitter Saturation Voltage      | $V_{BE(sat)}$ | $I_C=(-)2\text{A}$ , $I_B=(-)40\text{mA}$      |         | (-)0.83   | (-)1.2    | V             |
| Collector-to-Base Breakdown Voltage     | $V_{(BR)CBO}$ | $I_C=(-)10\mu\text{A}$ , $I_E=0$               | (-50)80 |           |           | V             |
| Collector-to-Emitter Breakdown Voltage  | $V_{(BR)CES}$ | $I_C=(-)100\mu\text{A}$ , $R_{BE}=\infty$      | 80      |           |           | V             |
| Collector-to-Emitter Breakdown Voltage  | $V_{(BR)CEO}$ | $I_C=(-)1\text{mA}$ , $R_{BE}=\infty$          | (-)50   |           |           | V             |
| Emitter-to-Base Breakdown Voltage       | $V_{(BR)EBO}$ | $I_E=(-)10\mu\text{A}$ , $I_C=0$               | (-)6    |           |           | V             |
| Turn-On Time                            | $t_{on}$      | See specified test circuit.                    |         | (40)30    |           | ns            |
| Storage Time                            | $t_{stg}$     | See specified test circuit.                    |         | (225)420  |           | ns            |
| Fall Time                               | $t_f$         | See specified test circuit.                    |         | 25        |           | ns            |

## Swicthing Time Test Circuit









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