



# 2SD1060

## Bipolar Transistor 50V, 5A, Low $V_{CE(sat)}$ NPN TO-220-3L

ON Semiconductor®

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### Applications

- Suitable for relay drivers, high-speed inverters, converters, and other general large-current switching

### Features

- Low collector-to-emitter saturation voltage :  $V_{CE(sat)}=0.3V$  max /  $I_C=3A$ ,  $I_B=0.3A$

### Specifications

Absolute Maximum Ratings at  $T_a=25^\circ C$ 

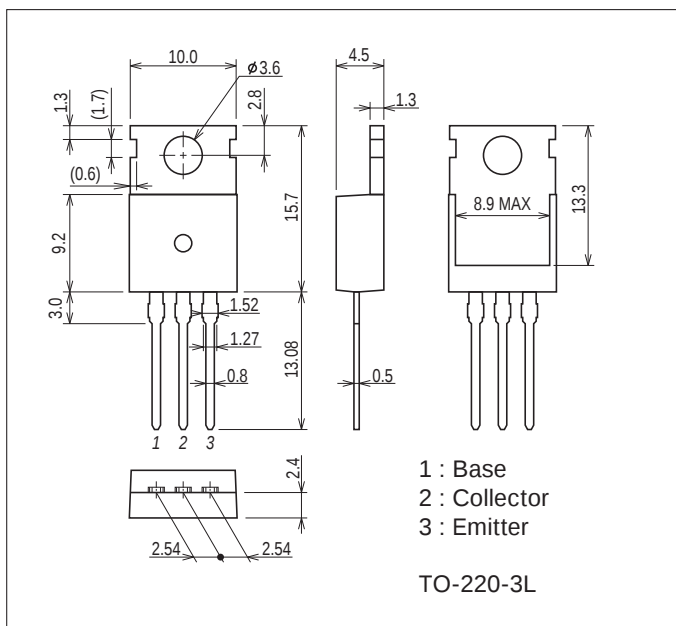
| Parameter                    | Symbol    | Conditions       | Ratings     | Unit       |
|------------------------------|-----------|------------------|-------------|------------|
| Collector-to-Base Voltage    | $V_{CBO}$ |                  | 60          | V          |
| Collector-to-Emitter Voltage | $V_{CEO}$ |                  | 50          | V          |
| Emitter-to-Base Voltage      | $V_{EBO}$ |                  | 6           | V          |
| Collector Current            | $I_C$     |                  | 5           | A          |
| Collector Current (Pulse)    | $I_{CP}$  |                  | 9           | A          |
| Collector Dissipation        | $P_C$     |                  | 1.75        | W          |
|                              |           | $T_c=25^\circ C$ | 30          | W          |
| Junction Temperature         | $T_j$     |                  | 150         | $^\circ C$ |
| Storage Temperature          | $T_{stg}$ |                  | -55 to +150 | $^\circ C$ |

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

### Package Dimensions

unit : mm (typ)

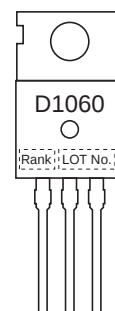
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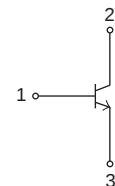
### Product & Package Information

- Package : TO-220-3L
- JEITA, JEDEC : SC-46, TO-220AB
- Minimum Packing Quantity : 50 pcs./magazine

### Marking



### Electrical Connection



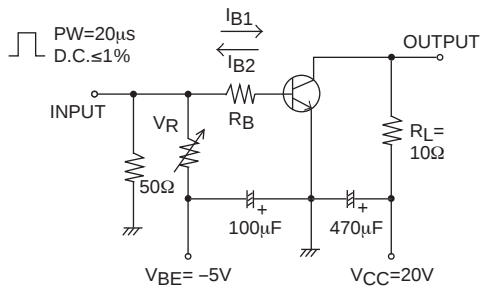
Electrical Characteristics at Ta=25°C

| Parameter                               | Symbol        | Conditions                 | Ratings |     |      | Unit    |
|-----------------------------------------|---------------|----------------------------|---------|-----|------|---------|
|                                         |               |                            | min     | typ | max  |         |
| Collector Cutoff Current                | $I_{CBO}$     | $V_{CB}=40V, I_E=0A$       |         |     | 0.1  | mA      |
| Emitter Cutoff Current                  | $I_{EBO}$     | $V_{EB}=4V, I_C=0A$        |         |     | 0.1  | mA      |
| DC Current Gain                         | $h_{FE1}$     | $V_{CE}=2V, I_C=1A$        | 100*    |     | 280* |         |
|                                         | $h_{FE2}$     | $V_{CE}=2V, I_C=2A$        | 80      |     |      |         |
| Gain-Bandwidth Product                  | $f_T$         | $V_{CE}=5V, I_C=1A$        |         | 30  |      | MHz     |
| Output Capacitance                      | $C_{ob}$      | $V_{CB}=10V, f=1MHz$       |         | 100 |      | pF      |
| Collector-to-Emitter Saturation Voltage | $V_{CE(sat)}$ | $I_C=3A, I_B=0.3A$         |         |     | 0.3  | V       |
| Collector-to-Base Breakdown Voltage     | $V_{(BR)CBO}$ | $I_C=1mA, I_E=0A$          | 60      |     |      | V       |
| Collector-to-Emitter Breakdown Voltage  | $V_{(BR)CEO}$ | $I_C=1mA, R_{BE}=\infty$   | 50      |     |      | V       |
| Emitter-to-Base Breakdown Voltage       | $V_{(BR)EBO}$ | $I_E=1mA, I_C=0A$          | 6       |     |      | V       |
| Turn-On Time                            | $t_{on}$      | See specified Test Circuit |         | 0.1 |      | $\mu s$ |
| Storage Time                            | $t_{stg}$     |                            |         | 1.4 |      | $\mu s$ |
| Fall Time                               | $t_f$         |                            |         | 0.2 |      | $\mu s$ |

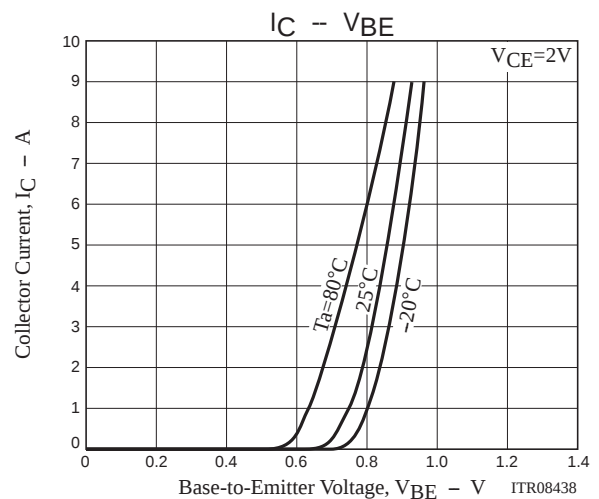
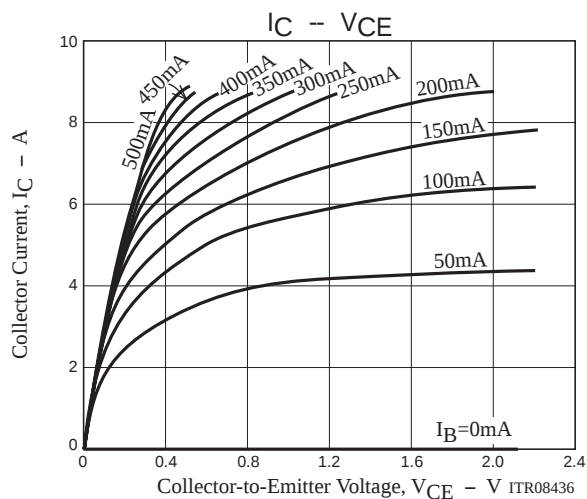
\* : The 2SD1060 is classified by 1A  $h_{FE}$  as follows

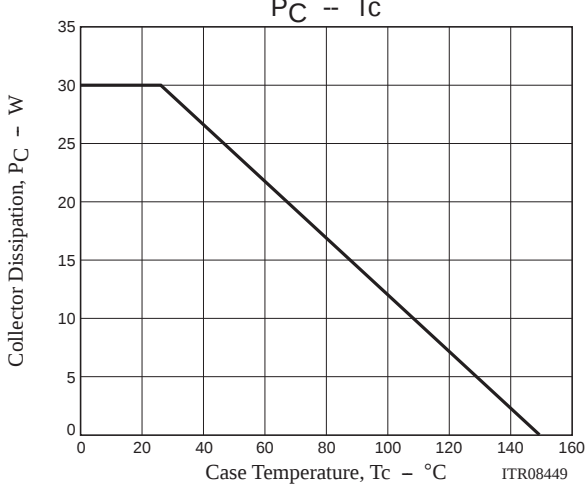
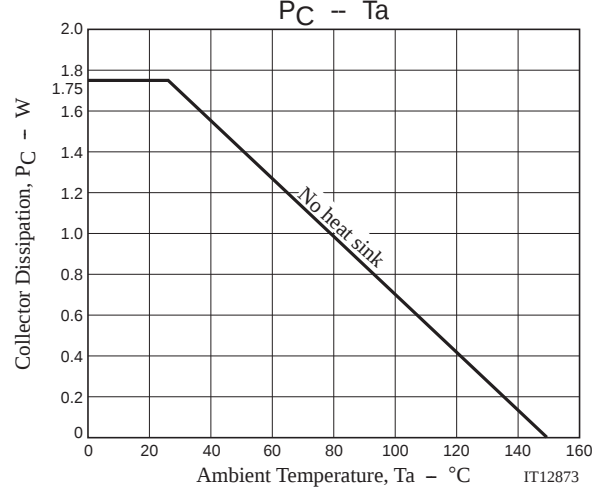
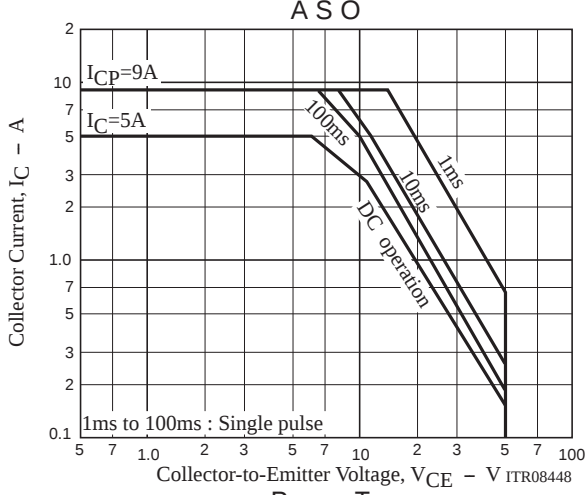
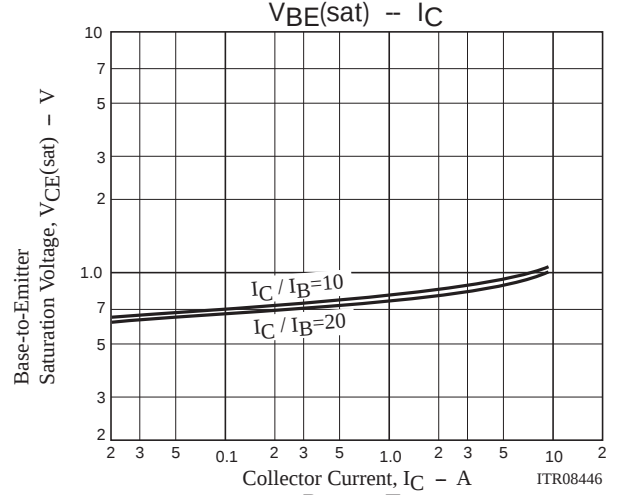
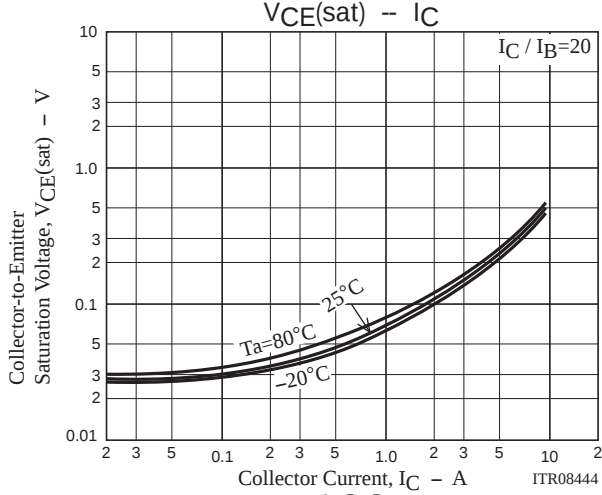
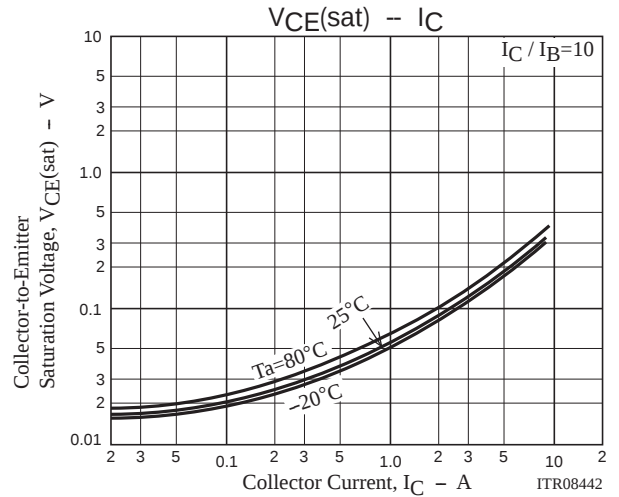
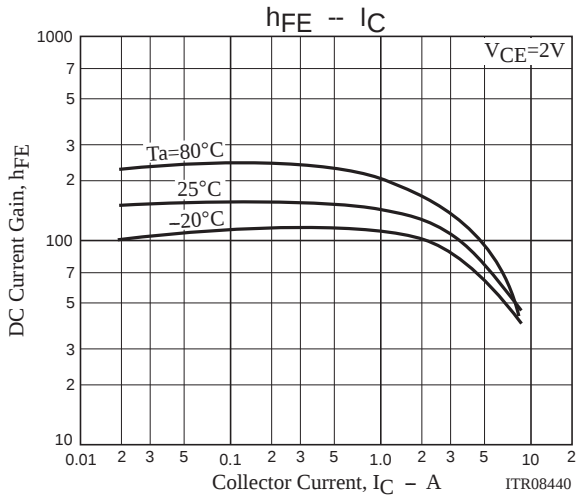
| Rank     | R          | S          |
|----------|------------|------------|
| $h_{FE}$ | 100 to 200 | 140 to 280 |

Switching Time Test Circuit



$$I_C = 10I_{B1} = -10I_{B2} = 2A$$





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