



## MJE13003D

Preliminary

**NPN SILICON TRANSISTOR**

### HIGH VOLTAGE FAST-SWITCHING NPN POWER TRANSISTOR

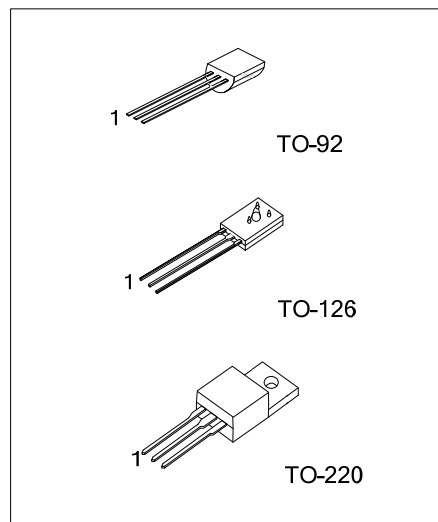
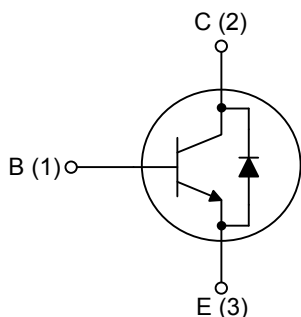
#### DESCRIPTION

The UTC **MJE13003D** is a NPN Power Transistor. It is intended to be used in applications requiring medium voltage capability and high switching speeds.

#### FEATURES

- \* Fast-Switching And High Voltage Capability
- \* Dynamic Parameters With Low Spread
- \* High Reliability
- \* Integrated Antiparallel Collector-Emitter Diode

#### INTERNAL SCHEMATIC DIAGRAM



#### ORDERING INFORMATION

| Ordering Number  |                  | Package | Pin Assignment |   |   | Packing   |
|------------------|------------------|---------|----------------|---|---|-----------|
| Lead Free        | Halogen Free     |         | 1              | 2 | 3 |           |
| MJE13003DL-T60-K | MJE13003DG-T60-K | TO-126  | B              | C | E | Bulk      |
| MJE13003DL-T92-B | MJE13003DG-T92-B | TO-92   | B              | C | E | Tape Box  |
| MJE13003DL-T92-K | MJE13003DG-T92-K | TO-92   | B              | C | E | Bulk      |
| MJE13003DL-T92-R | MJE13003DG-T92-R | TO-92   | B              | C | E | Tape Reel |
| MJE13003DL-TA3-T | MJE13003DG-TA3-T | TO-220  | B              | C | E | Tube      |

|  |   |
|--|---|
| <p>MJE13003DL-T60-K</p> <p>(1) Packing Type<br/>(2) Package Type<br/>(3) Lead Free</p> | <p>(1) B: Tape Box, K: Bulk, R: Tape Reel, T: Tube<br/>(2) T60: TO-126, T92: TO-92, TA3: TO-220<br/>(3) G: Halogen Free, L: Lead Free</p> |
|--|---|

■ ABSOLUTE MAXIMUM RATINGS ( $T_A=25^\circ\text{C}$ , unless otherwise specified)

| PARAMETER   |        | SYMBOL    | RATINGS    | UNIT             |
|---|--------|-----------|------------|------------------|
| Collector- Emitter Voltage ( $V_{BE}=0$ )                             |        | $V_{CES}$ | 700        | V                |
| Collector-Emitter Voltage ( $I_B=0$ )                                 |        | $V_{CEO}$ | 400        | V                |
| Emitter-Base Voltage ( $I_C=0, I_B=0.75\text{A}, t_P<10\mu\text{s}$ ) |        | $V_{EBO}$ | 9          | V                |
| Collector Current   |        | $I_C$     | 1.5        | A                |
| Collector Peak Current ( $t_P<5\text{ms}$ )                           |        | $I_{CM}$  | 3          | A                |
| Base Current  |        | $I_B$     | 0.75       | A                |
| Base Peak Current ( $t_P<5\text{ms}$ )                                |        | $I_{BM}$  | 1.5        | A                |
| Power Dissipation ( $T_C=25^\circ\text{C}$ )                          | TO-126 | $P_D$     | 40         | W                |
|   | TO-92  |           | 30         |                  |
|   | TO-220 |           | 70         |                  |
| Junction Temperature  |        | $T_J$     | 150        | $^\circ\text{C}$ |
| Storage Temperature   |        | $T_{STG}$ | -55 ~ +150 | $^\circ\text{C}$ |

Note: Absolute maximum ratings are those values beyond which the device could be permanently damaged. Absolute maximum ratings are stress ratings only and functional device operation is not implied.

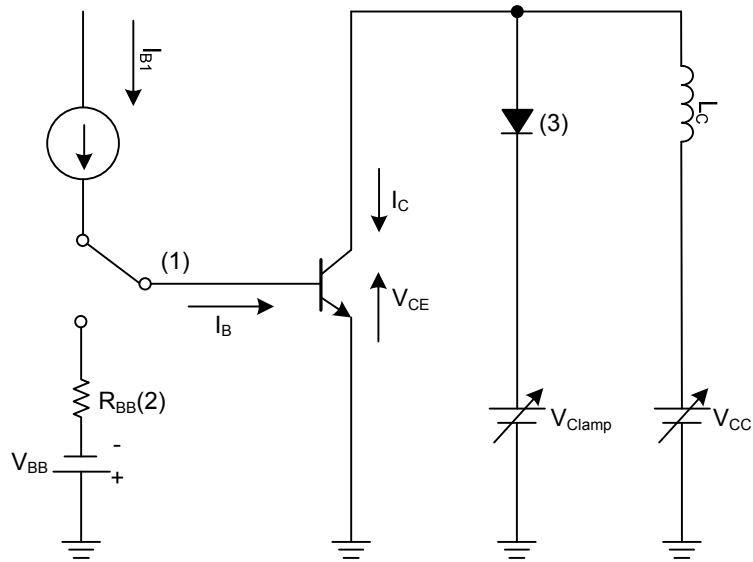
■ ELECTRICAL CHARACTERISTICS ( $T_C=25^\circ\text{C}$ , unless otherwise specified)

| PARAMETER                                   |              | SYMBOL         | TEST CONDITIONS  | MIN | TYP | MAX | UNIT          |
|---|--------------|----------------|--|-----|-----|-----|---------------|
| Emitter-Base Breakdown Voltage              |              | $V_{EBO}$      | $I_E=10\text{mA}, I_C=0$   | 9   |     | 18  | V             |
| Collector-Emitter Sustaining Voltage (Note) |              | $V_{CEO(SUS)}$ | $I_C=10\text{mA}, I_B=0$   | 400 |     |     | V             |
| Collector Cut-Off Current                   |              | $I_{CES}$      | $V_{CE}=700\text{V}, V_{BE}=0$   |     |     | 1   | mA            |
| Collector-Emitter Saturation Voltage (Note) |              | $V_{CE(SAT)}$  | $I_C=0.5\text{A}, I_B=0.1\text{A}$   |     |     | 0.5 | V             |
|   |              |                | $I_C=1\text{A}, I_B=0.25\text{A}$  |     |     | 1   | V             |
|   |              |                | $I_C=1.5\text{A}, I_B=0.5\text{A}$   |     |     | 3   | V             |
| Base-Emitter Saturation Voltage (Note)      |              | $V_{BE(SAT)}$  | $I_C=0.5\text{A}, I_B=0.1\text{A}$   |     |     | 1   | V             |
|   |              |                | $I_C=1\text{A}, I_B=0.25\text{A}$  |     |     | 1.2 | V             |
| DC Current Gain                             |              | $h_{FE}$       | $I_C=0.5\text{A}, V_{CE}=5\text{V}$  | 8   |     | 51  |               |
|   |              |                | $I_C=1\text{A}, V_{CE}=5\text{V}$  | 5   |     | 30  |               |
| Resistive Load                              | Rise Time    | $t_R$          | $V_{CC}=125\text{V}, I_C=1\text{A}, I_{B1}=0.2\text{A}, I_{B2}=-0.2\text{A}$                 |     |     | 1   | $\mu\text{s}$ |
|   | Storage Time | $t_S$          |  |     |     | 4   | $\mu\text{s}$ |
|   | Fall Time    | $t_F$          |  |     |     | 0.7 | $\mu\text{s}$ |
| Inductive Load Storage Time                 |              | $t_S$          | $I_C=1\text{A}, I_{B1}=0.2\text{A}, V_{BE}=-5\text{V}, L=50\text{mH}, V_{CLAMP}=300\text{V}$ |     | 0.8 |     | $\mu\text{s}$ |
| Diode Forward Voltage                       |              | $V_F$          | $I_F=0.5\text{A}$  |     |     | 1.5 | V             |

Note: Pulse Test: Pulse duration $\leq 300\mu\text{s}$ , Duty cycle $\leq 2\%$

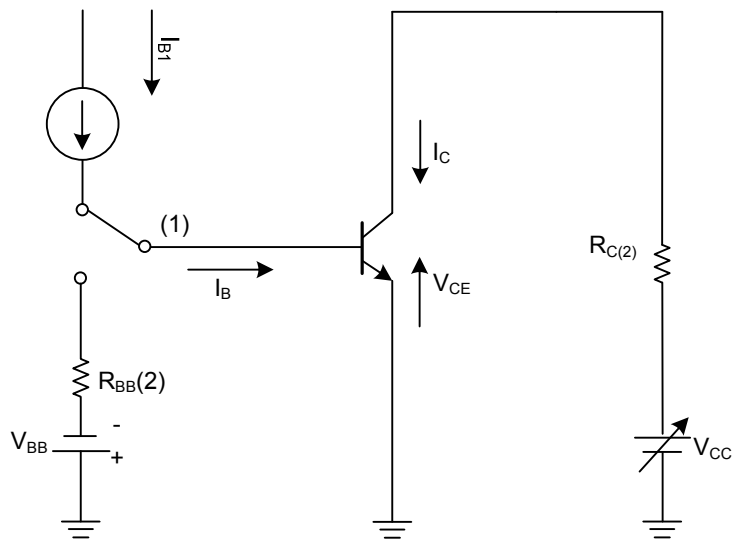
■ TEST CIRCUITS

Inductive Load Switching Test Circuit



- Notes: 1. Fast Electronic Switch
- 2. Non-Inductive Resistor
- 3. Fast Recovery Rectifier

Resistive Load Switching Test Circuit



- Notes: 1. Fast Electronic Switch
- 2. Non-Inductive Resistor

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