# MJE13005DC

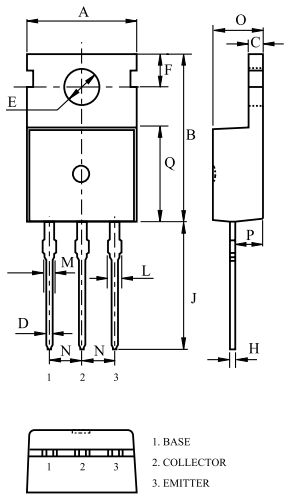
**TRIPLE DIFFUSED NPN TRANSISTOR**

HIGH VOLTAGE HIGH SPEED POWER SWITCH APPLICATION.

- Built-in Free wheeling Diode makes efficient anti saturation operation.
- Suitable for half bridge light ballast Applications.
- Low base drive requirement.

MAXIMUM RATING (Ta=25℃)

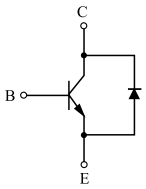
| CHARACTERISTIC | | SYMBOL | RATING | UNIT |
|---|---|---|---|---|
| Collector-Base Voltage | | $V_{CBO}$ | 700 | V |
| Collector-Emitter Voltage | | $V_{CEO}$ | 400 | V |
| Emitter-Base Voltage | | $V_{EBO}$ | 10 | V |
| Collector Current | DC | $I_C$ | 5 | A |
| | Pulse | $I_{CP}$ | 10 | |
| Base Current | | $I_B$ | 2 | A |
| Collector Power Dissipation (Tc=25℃) | | $P_C$ | 75 | W |
| Junction Temperature | | $T_j$ | 150 | ℃ |
| Storage Temperature Range | | $T_{stg}$ | -55 150 | ℃ |



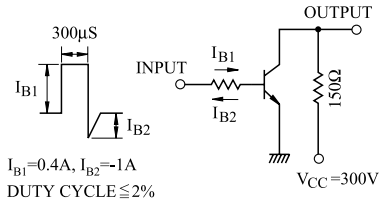

| DIM | MILLIMETERS |
|---|---|
| A | 10.0± 0.2 |
| B | 15.95 MAX |
| C | 1.3± 0.1 |
| D | 0.8± 0.1 |
| E | ø 3.6 ±0.2 |
| F | 2.8±0.1 |
| H | 0.5± 0.1 |
| J | 13.08± 0.3 |
| L | 1.4± 0.15 |
| M | 1.27± 0.1 |
| N | 2.54± 0.2 |
| O | 4.5± 0.3 |
| P | 2.4± 0.2 |
| Q | 9.2± 0.2 |

TO-220AB(1)

Equivalent Circuit




ELECTRICAL CHARACTERISTICS (Ta=25℃)

| CHARACTERISTIC | SYMBOL | TEST CONDITION | MIN. | TYP. | MAX. | UNIT |
|---|---|---|---|---|---|---|
| Emitter Cut-off Current | $I_{EBO}$ | $V_{EB}$=9V, $I_C$=0 | - | - | 10 | μA |
| DC Current Gain | $h_{FE}(1)$ | $V_{CE}$=5V, $I_C$=1A | 23 | - | 35 | |
| | $h_{FE}(2)$ | $V_{CE}$=5V, $I_C$=2A | 8 | - | - | |
| Collector-Emitter Saturation Voltage | $V_{CE(sat)}$ | $I_C$=1A, $I_B$=0.2A | - | - | 0.5 | V |
| | | $I_C$=2A, $I_B$=0.5A | - | - | 0.6 | |
| | | $I_C$=4A, $I_B$=1A | - | - | 1 | |
| Base-Emitter Saturation Voltage | $V_{BE(sat)}$ | $I_C$=1A, $I_B$=0.2A | - | - | 1.2 | V |
| | | $I_C$=2A, $I_B$=0.5A | - | - | 1.6 | |
| Collector Output Capacitance | $C_{ob}$ | $V_{CB}$=10V, f=1MHz | - | 65 | - | pF |
| Transition Frequency | $f_T$ | $V_{CE}$=10V, $I_C$=0.5A | 4 | - | - | MHz |
| Turn-On Time | $t_{on}$ |  | - | - | 0.15 | μS |
| Storage Time | $t_{stg}$ | | 2 | - | 5 | μS |
| Fall Time | $t_f$ | | - | - | 0.8 | μS |
| Diode Forward Voltage | $V_F$ | $I_F$=2A | - | - | 1.6 | V |
| *Reverse recovery tims (di/dt=10A/μS) | $t_{rr}$ | $I_F$=0.4A | - | 800 | - | nS |
| | | $I_F$=1A | - | 1.4 | - | μS |
| | | $I_F$=2A | - | 1.9 | - | μS |



*Pulse Test : Pulse Width = 5mS, Duty cycles≤10%

Fig 1. $h_{FE}$ - $I_C$

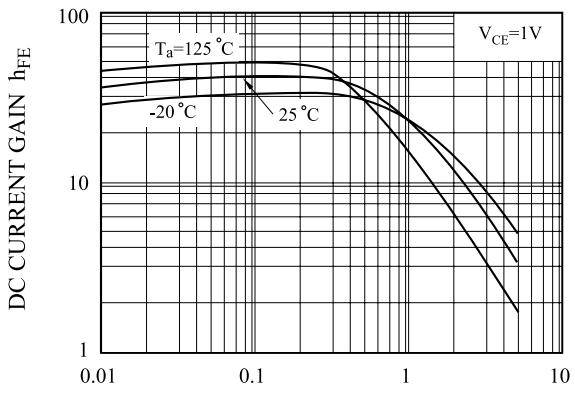



Fig 2. $V_{BE(sat)}$,$V_{CE(sat)}$ - $I_C$

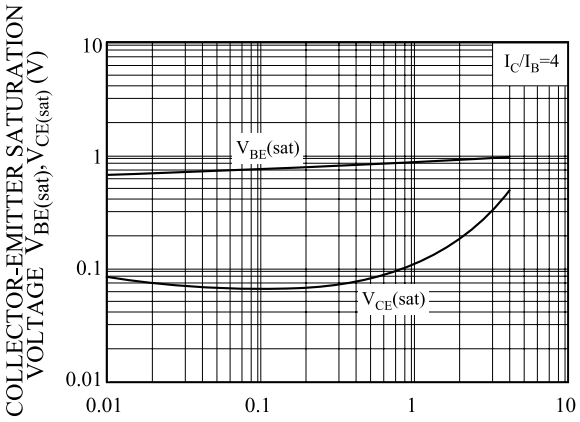



Fig 3. $h_{FE}$ - $I_C$

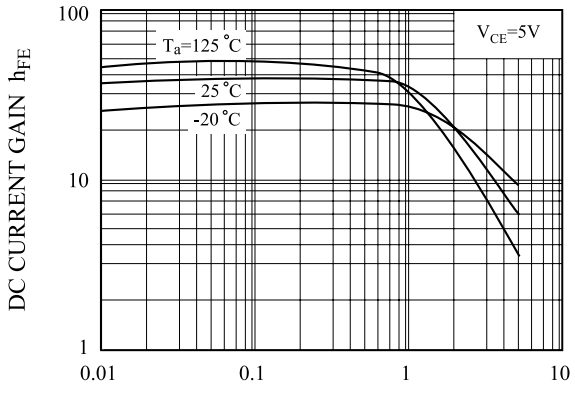



Fig 4. $C_{ob}$ - $V_{CB}$

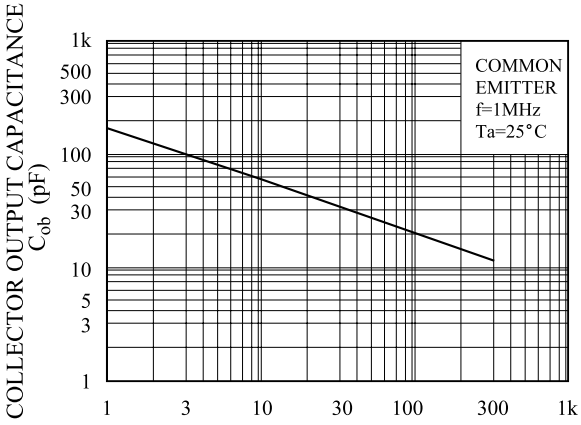



Fig 5. $I_C$ - $V_{CE}$

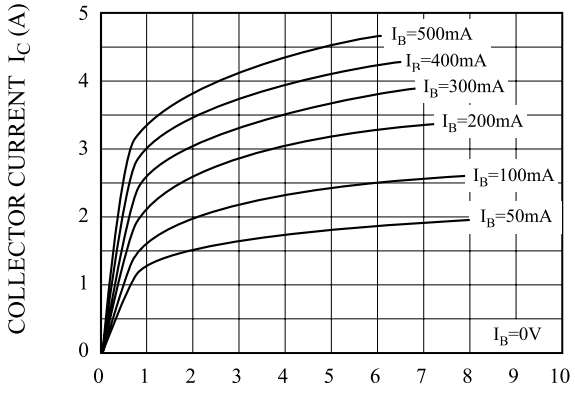



Fig 6. SWITCHING CHARACTERISTIC

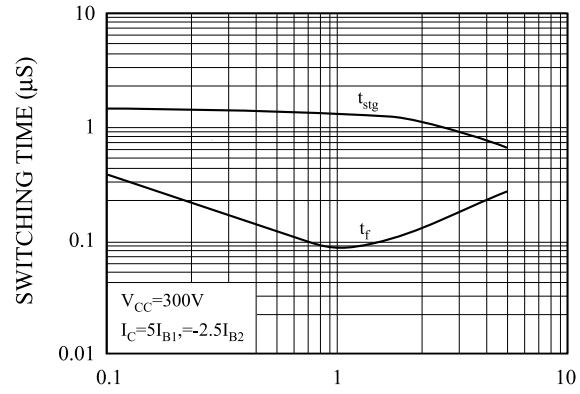


Fig 7. $t_{rr}$ - $I_F$

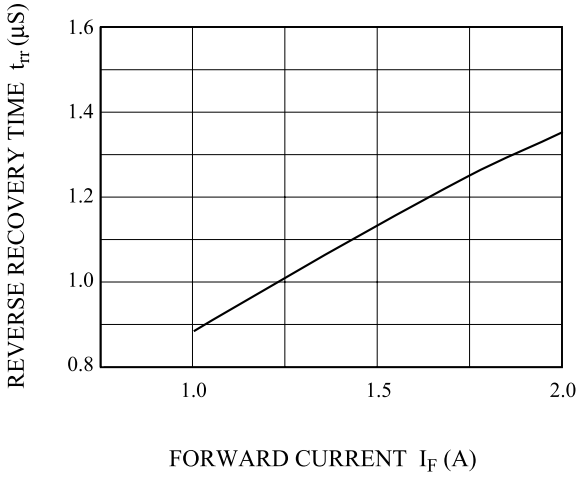



Fig 8. $V_F$ - $I_F$

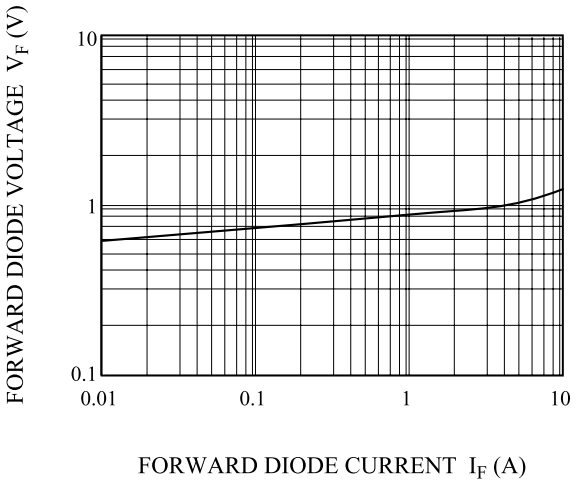



Fig 9. SAFE OPERATING AREA

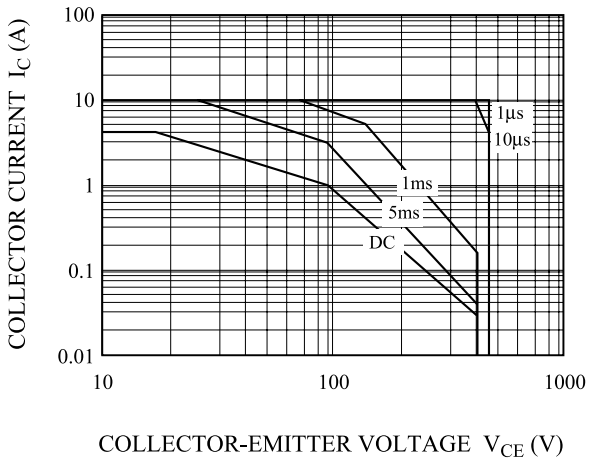



Fig 10. $P_C$ - Ta

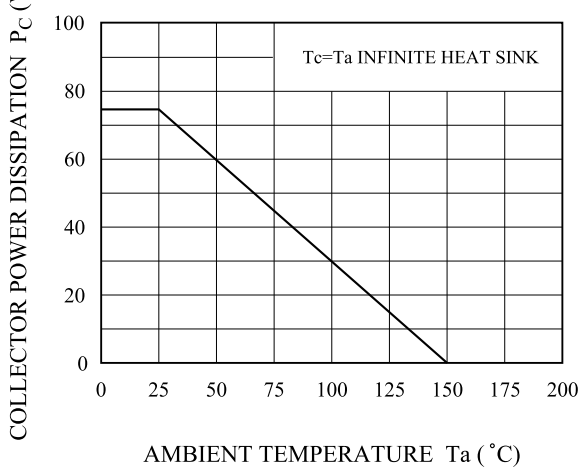
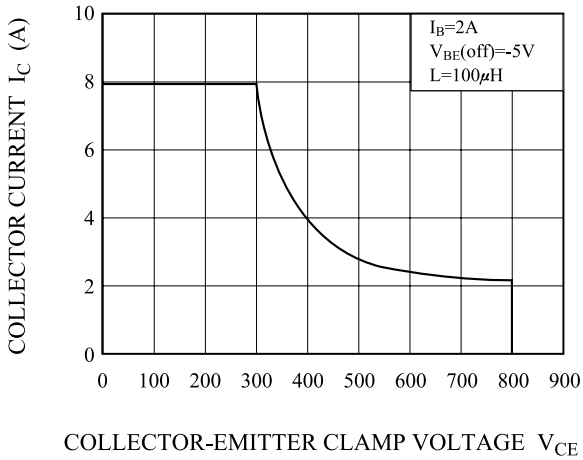
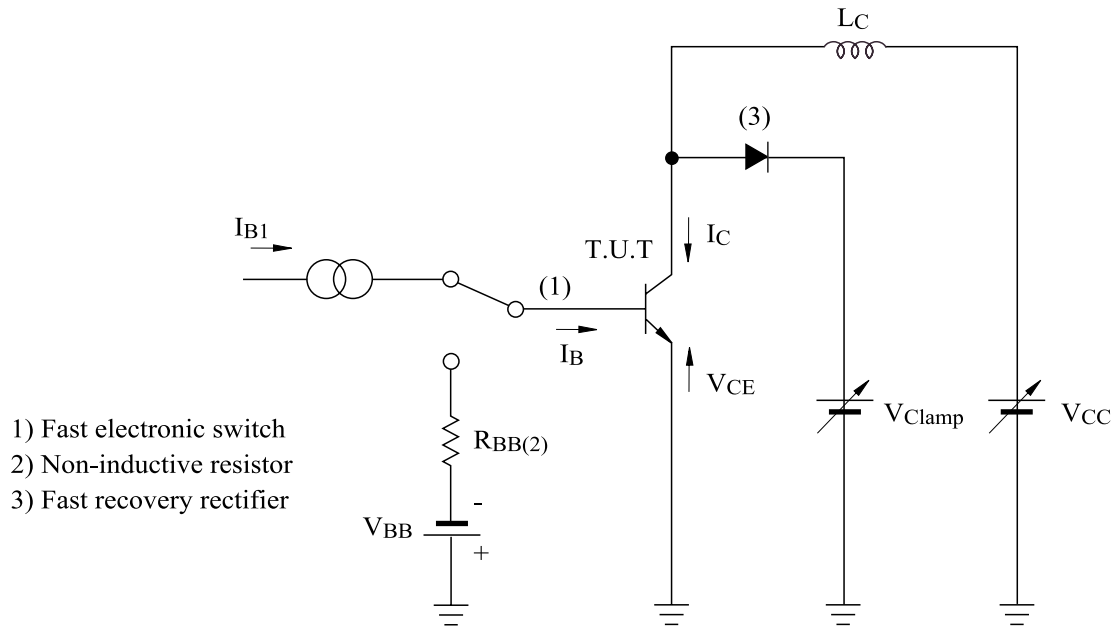



Fig 11. REVERSE BIASED SAFE OPERATING AREA



REVERSE BIASED SAFE OPERATING AREA TEST CIRCUITS




For inductive loads, high voltage and high current must be sustained simultaneously during turn-off, in most cases, with the base to emitter junction reverse biased.

Under these conditions the collector voltage must be held to a safe level at or below a specific value of collector current.

This can be accomplished by several means such as active clamping, RC snubbing, load line shaping, etc.

The safe level for these devices is specified as Reverse Bias Safe Operating Area and represents the voltage-current conditions during reverse biased turn-off.

This rating is verified under clamped conditions so that the device is never subjected to an avalanche mode.

Figure 11 gives the complete RBSOA characteristics.